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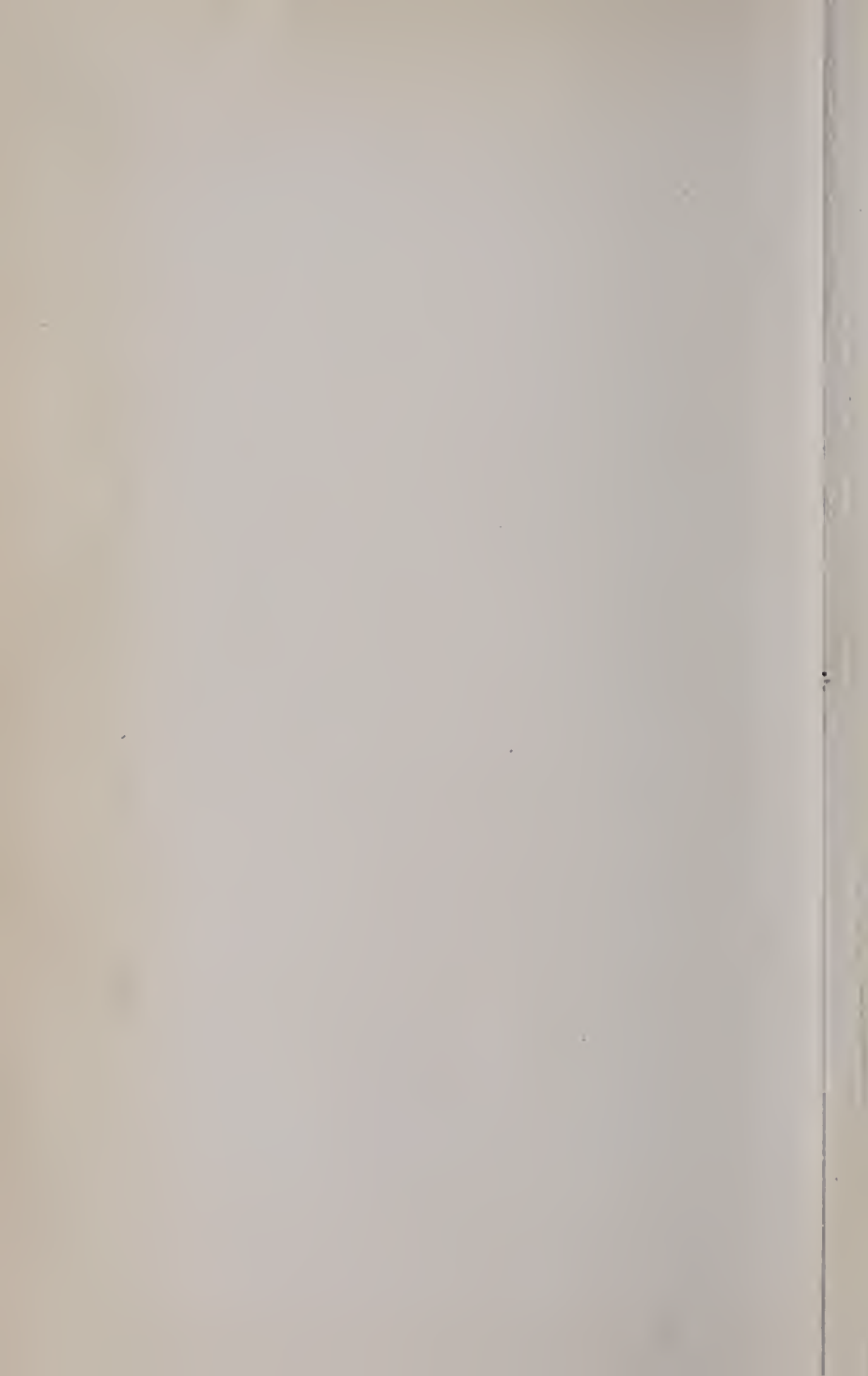
Journal of the Asiatic  
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JOURNAL  
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Nos. I. to VII.—1851.

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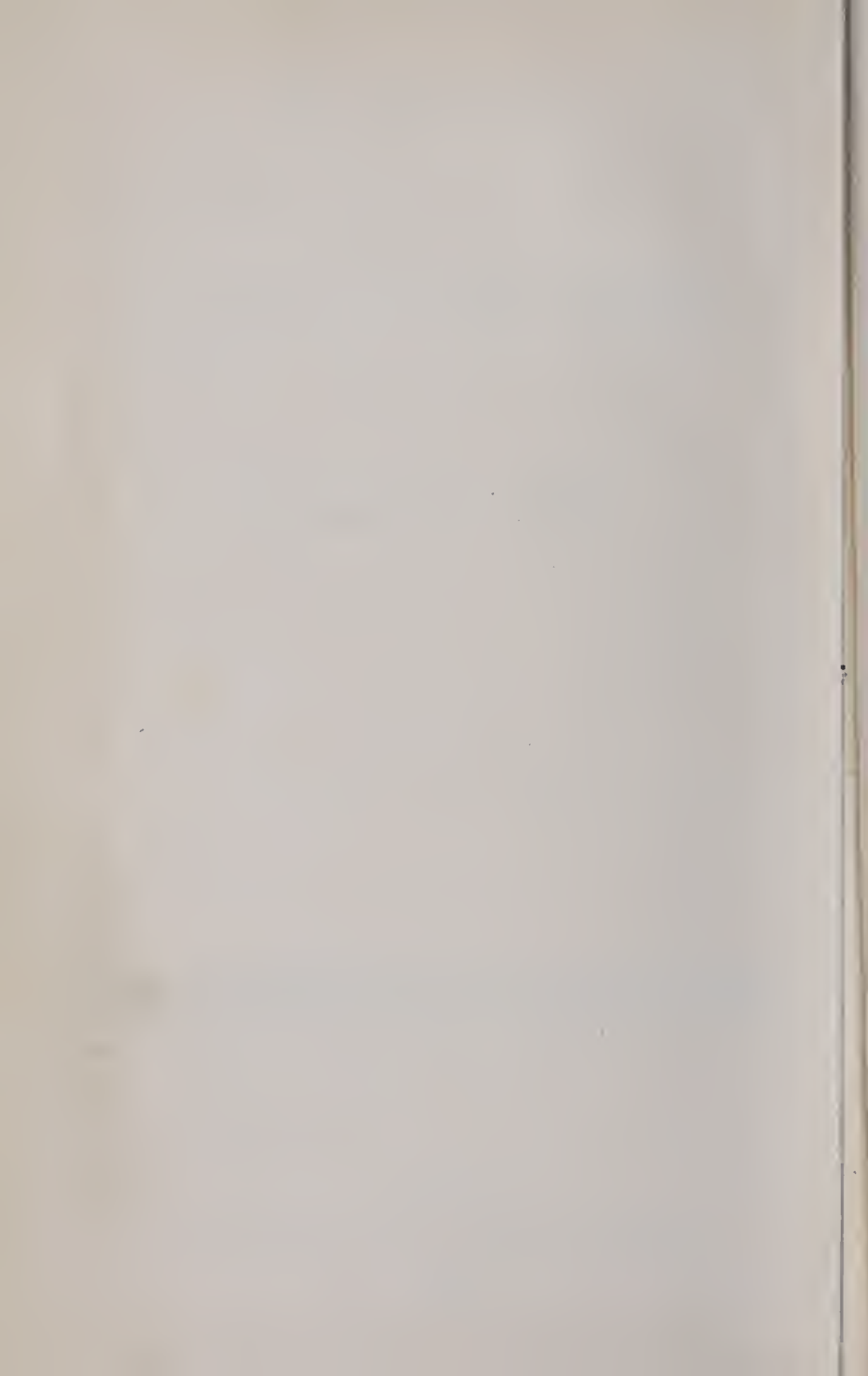
“ It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia* will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away if they shall entirely cease.”—SIR WM. JONES.

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1852.





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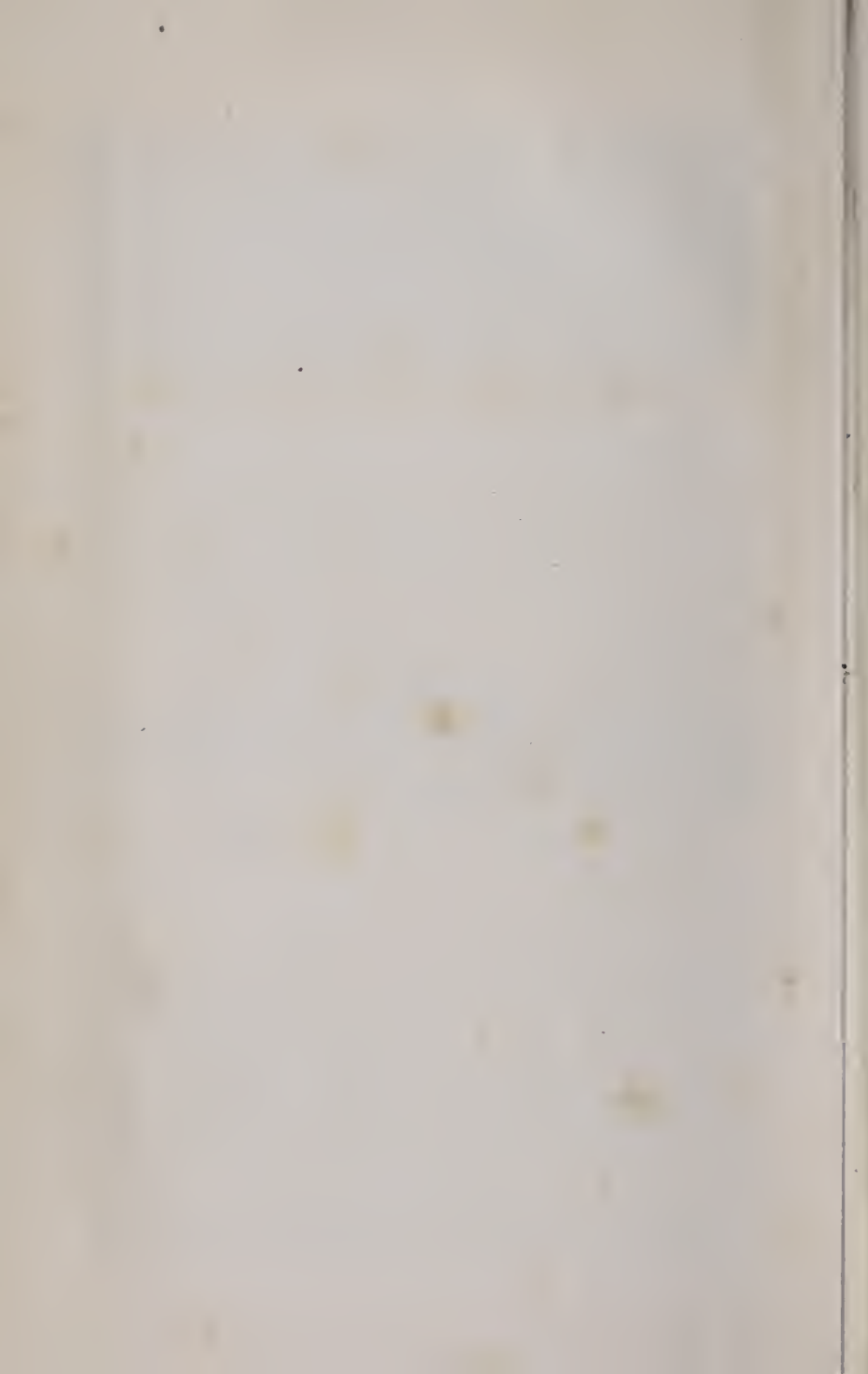
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#### ADDENDUM.

After the title of the paper on the Zinc Mines of Jawar, published in the last volume (page 212 et seq.) add the words—*Communicated by the Agricultural and Horticultural Society of India.*



# JOURNAL

OF THE

# ASIATIC SOCIETY.

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No. I.—1851.

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*Detailed Report on the Copper Ores of the Deoghur Mines.—By H. PIDDINGTON, Curator, Museum Economic Geology.*

## DISCOVERY OF THE ORE.

*From Captain W. S. SHERWILL, Revenue Surveyor.*

*To Captain H. L. THUILLIER, Deputy Surveyor General.*

*Camp, Zillah Bhaugulpoor, 31st January, 1850.*

SIR,—During the present month, and whilst engaged surveying Zillahs Beerbhoom and Bhaugulpoor, I was requested by Mr. Vincent, Deputy Magistrate of Deoghur, to visit and give my opinion upon a vein of copper that had a few months previously been accidentally discovered by a native and by him reported to Mr. Vincent.

2. Deoghur or Byjnath is a small Town in Zillah Beerbhoom, famous for its appearance, the inhabitants chiefly Brahmins.

The Town is situated on the great primitive Table-land which extends from near Burdwan to the Dunna Ghat in Behar, and which is composed of granite, gneiss, serpentine, greenstone, quartz, rock, &c., the gneiss strata are much contorted, often vertical, generally inclined and abundantly traversed by greenstone dykes. The appearance of the country is pleasing, the land is undulating, well wooded and studded with detached hills of rounded masses of garnetiferous gneiss. The spot where the copper is found is situated in the lands of the village of Byrúki of Tuppeh Deoghur, Saruth of Zillah Beerbhoom, and about one mile from the common boundary of Zillahs Beerbhoom and Bhaugulpoor; 8 miles N. W. from Deoghur or Byjnath, and on the watershed of the high land of Beerbhoom; the streams which flow to the



South falling into the Hooghly, those flowing to the North falling into the Ganges; it is situated in a dense jungle of Asun, Sakúa, Dhow, Kuchnar, Keud, Jámun, Aonlá, Kusmúbhá, Chirownjee, and is on the fork or junction of two small mountain torrents, which discharge their waters into the Chandun river, a tributary to the Ganges, which discharges itself into the Ganges near Bhaugulpoor; these torrents and the Chandun river are mere dry sandy channels during the cold and hot weather.

3. The occasion of the copper being brought to light was the hill men bringing in to Mr. Vincent, small pieces of a bright green species of waterworn felspar, which at once showed the existence of the ore. The ground in the immediate neighbourhood of the ore is pretty freely strewn with green felspar, and with weather and waterworn fragments of the ore embedded in the felspar. The immediate superficial soil is composed of quartz, felspar, hornblende, fragments of gneiss, black mica, silvery mica and shorl. The surface veins run East and West, and present the ore in irregular masses of  $\frac{3}{8}$  of an inch broad, so much corroded by atmospherical influence as to appear as a soft friable red, yellow, liver-coloured or garnet-coloured earth, but upon digging a couple of feet below the surface of the country, the veins become a compact liver-coloured mass, spangled with shining particles of copper; the whole enclosed in a soft friable apple-green, yellow or white felspathic rock. Traversing the copper from North to South small veins of lead appear, which occasionally form the containing walls to the copper. I traced the vein of copper for about 100 feet East and West and dug to the depth of two feet only. I have smelted with the aid of coal, dug from the Banslee Kullah in the Rajmuhul hills, some of the ore, which has given a return of 30 per cent. of good copper; inferior specimens, mostly waterworn pieces, picked up on the surface, gave 25 per cent. I have sent a large amount of the specimens, together with the smelted ore, to Mr. Piddington, Curator to the Geological Museum attached to the Asiatic Society, and have requested that gentleman to furnish you with a detailed account of its value, purity, &c. and which will form an addendum to this report; Mr. Piddington from his ability to do justice to the subject, and from his willingness to assist in such matters will, I am sure, supply you with his report. A copy of this report has been sent to Mr. Piddington.



4. In April, 1849, Mr. Vincent forwarded specimens and reported the circumstance of the existence of the copper ore to the Magistrate of Beerbhoom, but no notice has been taken of his report.

5. The nearest coal to the spot is at Kurkurbali, 40 miles S. W. in Pergunnah Kurruckdiha in Zillah Hazareebagh; coal is also found 57 miles in a South-easterly direction in the Rajmuhul hills.

6. Believing this to be a valuable discovery I lose no time in bringing it to your notice in the hope that you will bring it to the notice of Government; any further information relative to the spot or roads leading to it will be cheerfully supplied upon application being made to me.

(Signed) W. S. SHERWILL.

It may be proper, especially in reference to certain insinuations, which I refrain from qualifying, made at the July meeting of the Asiatic Society regarding the Museum of Economic Geology, to preface this report with the following letter; to explain alike the nature of the researches of which this paper contains the results, and the reasons why some notice of them was not earlier given. It may yet be, as every scientific Geologist and Mineralogist will understand, that the discoveries announced in it are connected with great questions of public revenue and unknown resources which we possess in India, and in the due execution of the trust imposed upon me as a servant of Government, it was necessary that the information this letter conveys should be in the hands of Government at the earliest period. Those who are acquainted with the difficulties of researches of this kind in India, and who feel with me what is due to the high standing of the Society's Journal will I trust find that nothing has been lost by a little delay.

SECRET SERVICE.

*From H. PIDDINGTON, Curator Museum Economic Geology.*

*To SETON KARR, Esq., Under Secy. to the Government of Bengal.*

SIR,—I am greatly averse to making any incomplete report on scientific matters, but learning from some conversation with Captain Thuillier that much speculation has been excited by the reports which were published by Government a short time ago regarding the recently discovered Deoghur Copper mines, and that some applications have been, or will be made to Government on the subject of them, I deem it right (though I originally intended to wait as I shall subsequently explain, until I could complete my investigation) to make the present report;

which I request may be deemed only a preliminary one, and made as a matter of duty that Government may be properly informed.

2. You will doubtless have remarked, Sir, in the report of Captain Sherwill to Captain Thuillier, that the former officer states that he had sent me a box of the ores, and I found upon the close mineralogical examination which such specimens require, that there was a considerable number of varieties, all of which had to be carefully classed and tested before their nature could be duly pronounced upon; many of them very small, and requiring to be repeatedly examined. To be brief, I may say that I have been most assiduously employed with them to enable me to give a complete report and that I have performed upwards of 150 examinations more or less complex upon about 20 species and varieties of these ores and their matrix, and that I am yet pursuing these, and have to repeat some when I can obtain more specimens before I feel safely assured of my results. You are, Sir, no doubt aware of the patient and vigilant research which such matters require that nothing may be passed over.

3. The results then so far as I can yet pronounce with safety is first that (8) eight of these ores contain more or less of silver, some of them traces only; others a promising proportion, but no estimate of the quantity can be made till good supplies of the ores are obtained. Mr. Dodd has, I observe, stated that the lead ore contains about 50 oz. of silver to the ton, in his report.

4. Next I had requested Captain Sherwill always to send down *all* that was about, or near to, any thing he thought of value, and this he has faithfully done on this occasion, and amongst the mere rubbish I have had the satisfaction to discover what I have been in fact looking to find for some twenty years in India and which I have examined perhaps 50 or 100 specimens from various parts of India in hopes of meeting with, but hitherto without success, till I have at length found it in the rubbish, or what the Cornish miners would call the *Gossan* of the Deoghur mines. I some years ago in the *Journal of the Asiatic Society* Vol. IX. p. 1144 in my report on the Museum of Economic Geology, then about to be established, announced that this mineral probably existed in India in the following words.

“I mention particularly here, the Mexican and Peruvian silver ores, because some of them would from their earthy appearance, and the

small proportion of metal they contain be passed by as mere red earthy soils or iron ores, which in fact they are; some of these ores form the staples of many of the great mines of Mexico and Peru, and it may be possible, that we have also deposits of these ores on the flanks of the Western Ghats; or in other situations of which the geological features approach to those of South America though upon a smaller scale."

The object of this notice was to draw public attention to the ores called *Pacos*, *Colorados* and *Negros*, especially the two first, which so much resemble rotten iron stones, or earthy iron ore, that none but those who know them would suppose they contain silver. The following extract from Jameson's *Mineralogy*, p. 75, describes the ore.

"In some parts of Mexico, however, as we are informed by M. Humboldt, the operations of the miner are directed to a mixture of ochry brown iron ore, and minutely disseminated native silver. This ochreous mixture, which is named *Pacos* in Peru, is the object of considerable operations at the mine of Angangués in the intendancy of Valladolid as well as of Yxtepexi, in the province of Oaxaca."

5. As before stated there are amongst the Deoghur ores some small but unequivocal specimens of the *Pacos*, and I have in the Museum of Economic Geology, from my own collections, a fine series of the true Peruvian ores to compare with.\*

6. I am in active correspondence with Captain Sherwill on this subject, and he informs me Mr. Vincent will proceed again shortly to the mines to obtain more specimens according to directions and specimens for guidance, which I shall forward.

7. It does not of course follow from this that the Deoghur mine is one of silver, or rich in silver, or worth working even if it was a silver mine; but on the other hand there may be rich deposits of ore near these indications; and the mere fact of the discovery of a *Pacos* in India is one of high mineralogical importance, since it may also exist elsewhere in greater abundance; but I have deemed it right that His Honor should be in early possession of the knowledge of it should any proposals come before Government relating to this property.

I have the honor to be, Sir, Your Obedient Servant,

H. PIDDINGTON,

*Museum, 3rd July, 1850. Curator Museum Economical Geology.*

\* These contain Copper as well as iron and so do those of Deoghur.

*From H. PIDDINGTON, Curator Museum of Economic Geology,  
To W. SETON KARR, Esq., Under Secretary to the Government of  
Bengal.*

SIR,—In continuation of my Secret Service letter of 3rd July, I have now the honor to submit for the information of Government a detailed report on such of the ores of the Deoghur mines as have reached me.

His Honor will be satisfied to see that from two of the classes of ores, of which only I could obtain a sufficient quantity for the experiment, the produce in silver has been a fair and a good average; though these are still but surface specimens, and that moreover (and upon this depends their value) the Spanish American process of amalgamation can be successfully practised at what may be supposed theoretically the very worst period of the year in India.

We have now to hope that the deposits, if wrought, will be found abundant.

(Signed) H. PIDDINGTON,  
*Curator Museum Economical Geology.*

*Calcutta, 31st December, 1850.*

## REPORT.

### PART I.—THE ROCKS.

In forwarding these specimens Captain Sherwill has sent also specimens of the rocks in which the vein lies, and to avoid confusion I briefly describe these separately from the ores.

No. 1. *A garnetiferous gneiss with horizontal veins of quartz passing through it, forms the general bed of the country at Deoghur.\**

No. 2. Gneiss with thin veins of quartz, no garnets.

No. 3. Decomposing pegmatite, forming the gangue in which the metallic veins are found; *3a. 3b. 3c. coarse granular pegmatite found on the surface of the country and contains the ores: It is all more or less decomposing.*

No. 4. Altered quartz rock, in some places nearly a jasper, and stained green by copper infiltrations.

\* These passages in Italics are Captain Sherwill's Notes.

No. 5. Schorly granite, or schorl rock of Cornwall, (See Boase, Primary Geology, p. 16,) schorl and quartz in distinct grains and imperfect crystals.

No. 6. Garnet rock, or garnetiferous quartz rock according to McCulloch (p. 326), who makes one of his subdivisions of quartz rock to be a granular quartz containing but little felspar, as in our specimen, in which it can be scarcely distinguished. Not an atom of mica is to be seen, but the garnets, (some small ones being semi-crystallized,) are abundant, and it might, so far as the presence of three ingredients is necessary to constitute a granite, be called a garnet granite.

No. 7.\* Compact pegmatite with veins of massive pistacite epidote.

No. 8. White and flesh-red felspar with nests and veins of acicular crystallized epidote (pistacite) of a bright pale green.

## PART II.—THE ORES AND THEIR DESCRIPTION.

After a most minute and careful examination as above described in my letter, I class the ores as follows :

1st Group.	Bright Peacock ore.	A.
Variegated copper ores, called Peacock ores by the miners.	Dull Peacock.	B.
	Marbled Peacock with a pale greenish <i>gossan</i> .†	C. contains silver.
2nd Group.	Dull Massive Grey Copper.	D. Silver.
Grey Coppers.	Bright Grey Copper.	E.
3rd Group.	Bright brick red <i>Pacos</i> .	F. Silver.
Red ores.	Dull, pale red, to liver-coloured <i>Pacos</i> .	G. Silver.
The <i>Pacos</i> and <i>Colorados</i> of Peru and Mexico.	Dark hard veins resembling Tile-ore with soft shining black specks and veins in it.	H. Silver.
4th Group.	Bluish green, earthy carbonates of copper, with bright red specks.	I. Silver.
Green ore.		
5th Group.	Bright large-grained Galenas.	J.
Galenas.	Cupro-Plumbite, an ore of copper and lead, in diagonally lamellar veins.	K.

\* This is No. 12 of Captain Sherwill's list where it follows the ores.

† Two small nodular specimens of this variety, of a dark earthy liver-coloured aspect, seem richer than the rest, but I have only these as yet and cannot spare them for a quantitative analysis.



These ores and their constituents may be described as follows :—

A.

*The Bright Peacock ores.*

This is the well known variegated vitreous copper ore of mineralogists, which contains from 50 to 70 per cent. of copper. Our specimens are in thin veins, of which the thickest is  $\frac{5}{8}$  (five eighths) of an inch thick, but as some specimens appear to contain a larger proportion of the poor yellow sulphuret, not more than 30 or 40 per cent. should be expected from this ore in practice. It contains no silver.

B.

Dull Peacock. This is a more ferruginous and earthy variety of the former ore, and of course would give less copper. It is indeed scarcely worth making a variety of. It contains no silver.

C.

Marbled Peacock ore. This is a variety which occurs marbled with green and red earthy mixtures. It runs (either at the termination of the vein or at the surface?) to a pale earthy *gossan*. It seems to contain a promising proportion of silver.

SECOND GROUP, FAHLERZEN, OR GREY COPPER.

D.

*Dull massive Grey Copper.*

This may be described a dull grey, greenish grey, and liver-coloured Fahlerz, the grey varieties sometimes shining with a micaceous or silvery lustre on the fresh fracture, the liver-coloured ones slightly micaceous also on the fracture but of a reddish-colour on the weathered or old surfaces. It is a true Fahlerz as to appearance, but I found it to contain, on an average from the pound taken for amalgamation of the grey and liver-coloured sorts together, in 100 parts.

Sulphur and a little water, .....	12.55
Earthy silicates, .....	33.85
Peroxide of iron, .....	8.33
Lead, .....	10.00
Copper, .....	32.70
Silver, .....	0.17
	<hr/>
	97.60
Loss, . . .	2.40
	<hr/>
	100.00

There is no trace of antimony in this mineral, and it thus forms a distinct lead Fahlerz! which I do not find any where described; the latest authority, Nicol (p. 490), appears to think lead an accidental occurrence. Before the blow-pipe in an open tube it blackens and gives an acid water, but no sublimate. On charcoal it gives no fumes nor any deposit but is converted without ebullition into a black cindery slag which with soda gives a pale metallic copper mixed with lead. If the heat is long continued the lead of course disappears and the copper alone remains.

This ore was one of those of which I could collect enough for an amalgamation by the Mexican process, and as will be seen in the sequel it gave a very good product.

## E.

*Bright Grey Copper.*

This is a grey copper, a Fahlerz with some lead but no silver. It is massive, with a steel-grained fracture, and brittle, but the latter portions are hard to pound; with green and yellow marblings and stains, it passes into a green and yellow earthy *gossan*.

## 3RD GROUP, RED ORES.

## F.

*Bright, brick-red Pacos, or Colorados.*

This ore exactly resembles the museum specimens of Peruvian *Pacos* from my own collections, that is, an earthy iron ore. I collected a sufficiency of this ore to subject a pound troy of it to a proper Mexican amalgamation process, of which the results will be described in Part III.

The composition of an average lot taken from that used for amalgamation was as follows:—

Water, sulphur and carbonic acid,*	14.30
Silver,	0.21
Iron, peroxide,	15.40
Copper, peroxide,	27.20=21. 8 copper.
Sulphur,	10.45
Earthy silicates,	32.45
	<hr/>
	100.01

It is thus a tile copper ore, with a minute portion of silver.

\* Some of the Copper appears to be in the state of Carbonate.

## G.

*A dull, pale red, and liver-coloured Pacos.*

This ore also contains silver, and two small nodular specimens of a dark earthy liver-coloured aspect, seem richer than the rest, but I have as yet only these two bits, and indeed not much of any of this kind.

## H.

Dark hard veins of a red tile-copper ore, with black shining specks and veins of protoxide of iron. This ore contains some silver but we have but very little of it, and I can only roughly estimate it by a guess at about two-thirds the value of F.

## 5TH GROUP, GALENAS.

## J.

*Bright large-grained Galena, no silver.*

## K.

*Cupro-Plumbite (Breithaupt).*

This is another Peruvian ore which we have unexpectedly found. It may be described as massive, in very thin veins, forming alternate streaks of a bright and dull, dark, blue-grey, galena-like mineral; the streaks lying diagonally across the small veins; sometimes in larger glancing masses, and at others in thin needle-like streaks. I have not found any silver in it, though Breithaupt gives it 0.5 per cent. Before the blow-pipe, in the open tube, it fuses and gives acid fumes.

On charcoal it melts, swells up, and boils, sending out a rapid stream of dull sparks if brought too near the reducing flame. Finally it gives a globule of lead which contains copper but no silver.

Our specimens are all in such very thin veins that a quantitative analysis would always give uncertain results, owing to the matrix. I have therefore preferred to wait till we obtain larger masses with some new supply.

## PART III.—AMALGAMATION ASSAYS.

I thought it of much importance that we should ascertain if, with the high temperature and great moisture prevailing here during most part of the year, the Mexican amalgamation process could be successfully used for the extraction of the minute portions of silver which



these ores contain, and by which only they can be wrought to profit,\* and having obtained a supply, though rather limited in quantity, I first most carefully picked and sorted the ores, and obtained a pound troy weight of two of them, from which the following experiments were made, after some preliminary trials of which it is unnecessary *here* to give particulars ; being, though tedious, only those which all laboratory work requires before an experiment for publication is made.

#### AMALGAMATION I.

*The first was the ore F. a bright brick-red Pacos.*

One pound troy was carefully reduced to a fine powder, and salt and *magistral*† added, in larger proportions than usual on the large scale, in a large mortar, and on subsequent days the mercury was duly added, but also in larger proportions, to insure the successful extraction of all the silver.

The mass was worked over every two days by the pestle, and kept at the proper degree of moisture. On the twenty-fourth day it was carefully washed off, and the mercury driven off by heat ; and though there was some small loss from ebullition of the mercury in the crucible, and some also in washing such small quantities, as I ascertained by experiment, yet I had the satisfaction of obtaining 5 grs. of pure silver from the pound troy ; which for the *Caxon* of 5000 pounds Avoirdupois would give somewhat better than  $8\frac{1}{4}$  marcs of silver to the *Caxon* ; and ores are sometimes wrought in Mexico and Peru of 2 and  $2\frac{1}{2}$  marcs when quicksilver is cheap : Ores which give above six marcs being called good metal. The highest specimen we have in the museum is marked as giving 500 marcs and the lowest 20 ; but all those so valued are sulphurets ; none of the *Pacos*, unfortunately, are valued.

#### AMALGAMATION, No. II.

The second trial by amalgamation was with the specimen D, the dark liver-coloured Fahlerz, the only one, besides the above, of which I could obtain a troy pound weight. The process was of course the same, but, though the weather was cooler, only 20 days were allowed

\* All attempts to introduce the German and other amalgamation processes in Mexico have been failures with the poorer ores which form the riches of the great Mexican mines ; and this error was in great part the ruin of the Mining Companies from England.

† Roasted sulphuret of Copper.

to this experiment; and I think 15 might have sufficed, but my first object was to prove the perfect practicability of the Spanish American processes with various ores, and to ascertain the full quantity of silver without reference to the expenditure of the ingredients, which on so small a scale were necessarily used in larger quantities, or of the time, which can only be definitely settled by large experiments also. The result of this trial too was highly favourable, as somewhat more than 8 grs. of pure silver were obtained; but taking the produce at 8 grs. this would be for the *Caxon* of 5000 pounds Avoirdupois, as before, 13.5 marcs, and thus above an average ore.

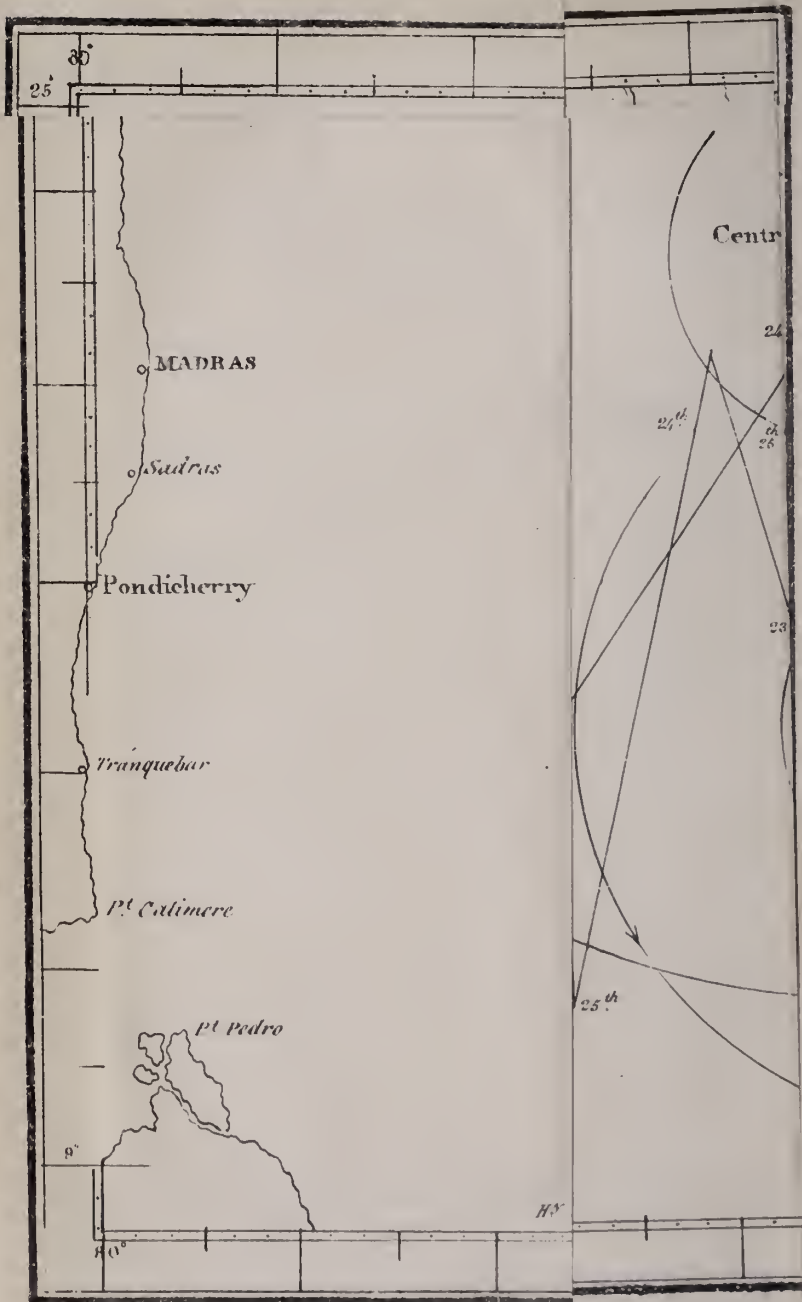
It will be observed that I have used the Cornish term *gossan* when speaking of some of these ores, to designate the instances in which the copper ores run into a pale red, earthy ore, which is in fact (as in C.) a *Pacos*, as it contains a portion of silver. This word *gossan* is a term used by the Cornish miners to distinguish exactly an earthy, friable, ferrugino-cupreous earth, which appearing at the surface is held to be an indication of copper below. It is in fact a copper *Pacos*, but contains no silver, and it does not, that I am aware, as some of our specimens do, shew itself to be a separate mineral by running in a distinct vein at right angles into, and altering the copper vein where it meets it. Cornish *gossan* is also friable and full of hollows, like ore in a state of decomposition, which it is generally supposed to be; ours more resembles a high-coloured but soft brick, except in II. which might be taken for a red iron ore.

As a good *gossan* in Cornwall is taken to be an indication of a good copper vein, so the *Pacos* in Peru, and the *Colorados* in Mexico, (being the same mineral) are held to be good indications of silver below; and it is said too that it is rarely found to run deep, that is, not above 50 or 100 fathoms, changing then to richer ores. Whether this be the case at Deoghur, time and enterprize can only shew us. From analogy one would say there may be something worth sinking a small shaft for, and tracing how far the veins extend on the surface; and if they crop out at any other part. The Copper and Cupro-Plumbite (K.) may be well worth exportation in their raw state, when simply dressed and picked with care.

In a geological and mineralogical point of view the discovery of these ores in a country yet so little known to us holds out some hope

CHART  
TO THE  
TWENTIETH MEMOIR  
on the Law of Storms  
IN INDIA  
*Being*  
THE BAY OF BENGAL CYCLONE  
OF APRIL 1850  
BY  
HENRY PIDDINGTON







that we are only yet at the threshold of what we have still to find ; but it will be the first successful working of a mine which will stimulate speculation in that branch of industry, and I have spared, and shall spare no trouble to assist it, so far as the resources of the museum extend.

H. PIDDINGTON,

*Curator Museum Economic Geology.*

*Calcutta, 31st December, 1850.*

No. 48.

*From the Under Secretary to the Government of Bengal,*

*To H. PIDDINGTON, Esq., Curator Museum Economic Geology.*

*Dated, Fort William, 8th January, 1851.*

SIR,—I am directed by the Deputy Governor of Bengal to acknowledge the receipt of your letters dated the 3d July last and 31st ultimo, and to state that His Honor has perused with interest your reports on the qualities of the ores from the Deoghur Mines in the Zillah of Beerbhoom.

(Signed) W. SETON KARR,

*Under Secretary to the Government of Bengal.*

(True Copy,)

H. PIDDINGTON,

*Curator Museum Economic Geology.*

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*A Twentieth Memoir on the Law of Storms in the Indian and China Seas, being the APRIL CYCLONE of the Bay of Bengal ; 23rd to 28th April, 1850.—By HENRY PIDDINGTON, President of Marine Courts.*

In April, 1850, the Eastern quadrants of a Cyclone passed over Calcutta which, there was no doubt, had been a severe one at sea and in other parts on shore ; and which I so announced in the papers, and I have been diligently employed since that time in collecting the documents necessary for its investigation, some of which only reached me lately from England. The present Memoir is the result of my labours, and it will I hope be found worthy of its predecessors, tracing as it does a severe, and at times a furious, Cyclone for a course of a

thousand miles, from near the Nicobar Islands to Moorshedabad; and affording us some valuable lessons as to parallel Cyclones and the dependence to be placed on the Barometer. It also adds an important page to our history of the tracks of storms in the latitudes between Acheen Head and the Andaman Islands.

The same arrangement has been preserved in this Memoir as in the preceding ones. The documents are first given and then tables of the winds and weather for each day all over the Chart. This is followed by a summary, shewing the grounds on which the position of the daily Centres are given and comprising such other results as are thought worth notice.

*Abridged Log of the Barque IRON GEM, Capt. GOOD, from North Shields, bound to Calcutta. Civil Time.*

*At noon 22nd April, 1850.*—The *Iron Gem* was in Lat.  $6^{\circ} 47' N.$ ; Long.  $87^{\circ} 49'$  East with winds about at (7 and 6),\* variable from N. W. Ship standing to the Northward. Cloudy weather. P. M. blowing fresh in heavy squalls from N. N. W. to midnight. 11 P. M. the main piece of the rudder broke off by a heavy blow of a sea.

*23rd April.*—Weather rather moderating from 4 to 8 A. M. after which as bad or worse than before, with heavy blinding squalls and sheets of rain. Wind N. W. to N. N. W.; at noon from (7 to 8;) Lat. Acct.  $6^{\circ} 40' N.$ ; Long.  $88^{\circ} 25'$  East. P. M. increasing to (9,) with terrific squalls. Wind to W. N. W. Ship hove to.

*24th April.*—Wind veering to N. W. b. W. and Westerly. Very heavy squalls. Ship lying to. Noon Lat.  $6^{\circ} 37'$  North; Long.  $88^{\circ} 40'$  E. P. M. wind West, decreasing from (9,) at noon, to (4) at 7. P. M.

*25th April.*—A. M. out second reefs. Noon Lat. Obs.  $6^{\circ} 51'$ ; Long.  $88^{\circ} 52'$ . Wind West from (9) to 3 at noon.

*Abridged Log of the Ship COWASJEE FAMILY, Capt. DURHAM, from Singapore towards Calcutta. Civil Time.*

The *Cowasjee Family* passed Point Pedir at noon on the 19th April. On the 20th and 21st, she had light Southerly and S. Westerly breezes.

*On the 22nd April.*—The wind veered from S. b. E. to Easterly, and at noon was N. b. E., when Lat.  $9^{\circ} 21'$  North Long.  $90^{\circ} 03'$  East. P. M. moderate breezes E. N. E.; and at 6 P. M. to midnight N. E. with squalls at times, ship standing to the N. N. W.

\* Admiral Beaufort's Numbers.

23rd April.—A. M. Squally. Noon, strong N. E. breeze with dark gloomy weather. Lat. Acct.  $11^{\circ} 45' N.$ ; Long. Chr.  $88^{\circ} 24'$ ; Simpiesometer 8 A. M. 29.76; noon 29.76. P. M. fresh breeze N. Easterly, with hard squalls moderating at 9 and increasing again at midnight with constant rain; ship standing to the N. W. with all preparations made for bad weather.

24th April.—To 4 A. M. wind N. E.; at 6, N. N. E.; at 10, North to noon. Increasing from a hard gale to “a perfect hurricane”\* at 9.30 A. M., when ship lying to very badly, bore up and scudded S. S. W.; wind North, ship under bare poles “blowing an unadulterated hurricane.” At noon the same, with a great deal of thunder, sails blowing from the yards. Position not given. Simpiesometer at 29.58, “but it does not appear to act at all.” P. M. hurricane and dreadful thunder with constant deluges of rain. Ship running 9 knots to the S. b. E.  $\frac{1}{2}$  East; wind now N. b. W.; at 3, N. N. W.; at 5, N. W. b. N.; at 8, N. W.; and at midnight W. N. W. At 8 P. M. weather moderating. “We fancy the centre of the hurricane is now past us.” Midnight decreasing with a high sea from the Northward.

25th April.—A. M. moderating and clearing up “having now run out of the storm circle” wore ship to stand on her course. Noon wind W. S. W. could not carry much sail on account of the very heavy confused sea, mostly from the Northward. Lat. Obs.  $9^{\circ} 45' N.$ ; Long. Chr.  $87^{\circ} 10'$  East, having experienced 78 miles of storm current to the South. P. M. moderate W. S. W. monsoon, but heavy sea from the Northward; exchanged Nos. with the ship *Duke of Wellington* who signalled “A gale is coming on, I think; we have had a very heavy sea from the Northward.” To midnight the same. Ship making  $5\frac{1}{2}$  knots to the North with the same swell.

26th April.—To noon, when in Lat.  $11^{\circ} 54' N.$ ; Long.  $87^{\circ} 05'$  East. A brisk monsoon and clear weather, ship making 7 knots, but the heavy confused sea is still complained of and it continues to noon of the—

27th April.—When the ship is in Lat.  $13^{\circ} 45'$  North; Long.  $87^{\circ} 22'$  East.

*Abridged Log of the BRIG NEREID, Capt. ESCOTT, from Akyab bound to Antwerp. Civil Time.*

I print, nearly entire, the summary of this very able log as sent me by Capt. Escott. The italics are mine.

The *Nereid* left Akyab, April 18th, and carried light winds Westerly and N. W. with fine weather until 23rd being then only in  $16^{\circ} 10' N.$  and  $90^{\circ} 11' E.$ ; Bar. 29.85; Ther.  $87^{\circ}$ .

24th April.—Light winds N. N. E. throughout (3-4 c. o.)† Sun obscured. Acct.  $14.50 N.$ ;  $89.20 E.$ ; Bar. 29.80; Ther.  $87^{\circ}$ . Slight rain. P. M. light baffling

\* These words between commas are copied literally from the Log.

† Admiral Beaufort's figures and letters.

winds shifting suddenly from all quarters. Thick rain t. and l. 1 P. M. breeze settled at N. E. increasing gradually. At 4 P. M. N. N. E.; 5, Bar. 29.75 o. r. t. l. In small sails, and prepared for bad weather. At 8 P. M. N. N. E.; At 8, Bar. 29.65 q. r. Running S. S. W. 8 k. midnight steady at N. N. E. gradually increasing. (9). Sea rising fast, 29.58, q. r. steering S. S. W. since noon 88' miles.

25th April.—3 A. M. N. N. E.; (9) Barometer steadily falling r. q. Sea high but regular: Bar. 29.41. Close reefed main topsail; furled foresail and scudded S. S. W. under the close reefed main topsail and reefed foresail; 8 knots. 4 A. M. veering N. E. and back again to N. N. E. Same weather and a heavy sea; 29.35; wind N. N. E. (10.) 5 A. M. N. N. E. blowing in heavy gusts. At 10h 29.30; shipped a sea on main deck, knocking bulwarks away and breaking adrift water-cask spars and launch. Ship labouring heavily. Hauled foresail up, and lay ship to until we got launch and spars secured again; most of the water casks were either washed overboard or stove to prevent injury to the main deck stancheons and splitting the covering boards open. At 6 A. M. N. N. E.; 11h 29.28; at 8, 29.28 North; (11,) r. o. q.; at 8 A. M. being all secured again and finding the gale increasing, "*knowing myself to be in front of the approaching centre* bore away again under close reefed main topsail and fore-topmast stay sail right before it, making about South course. At 10 A. M. N. N. W.; (11) Bar. 29.28; At 11, N. W. by W.; (10,) 29.30 q. r. o. Noon heavy gale at W. N. W. with heavier squalls, more violent and at shorter intervals. Expecting to see the main topsail go to pieces every moment. Bar. 29.30 (rising) r. o. q. Sun obscured all day. Lat. by Acct. 12° 40' N.; Long. by Acct. 88° 27' E.; Ther. 84°. P. M. begins with a hard gale; (10,) and a mountainous sea running. Fore-topmast stay sail blew away; bent a new one; at 4 P. M. apparently moderating, wind now W. by N.; (9,) squalls less violent; Bar. 29.45 c. q.; at 6, wind West; (8,) weather gradually moderating and the clouds breaking up in large openings and clear intervals, having previously been perfectly overcast all round. Set reefed fore-sail and treble-reefed fore-topmast. At 8, still clearing away, stars now visible. Bar. 29.60; wind W. S. W.; at 8, c. Midnight fresh gales and cloudy with a high sea. Wind W. S. W.; (7,) 29.63.

26th April.—Still becoming gradually moderate and fine, wind S. W.; (6,) set jib, mainsail, &c. 29.65; 8 A. M. wind moderating with clear weather, wind S. W.; (5,) 29.67; made sail accordingly. Noon fresh breezes with clear weather, wind S. W.; 29.70; Ther. 87°; Lat. Obs. 11° 37' N.; Long. Obs. 88° 59' E.

*Memorandum.*—I have endeavoured to describe the weather and the strength of the wind by Capt. Beaufort's system with which you are doubtless well acquainted and trust I have made it sufficiently intelligible. I should not omit to remark that on the evening of the 24th, the *Eastern* horizon for some 15° in



altitude was varied by that bright scarlet tinge seen Westward at sunset. This continued from sunset until nearly 9 P. M. During that night much lightning to the Southward and S. Eastward. Also on the 25th, P. M. as per log much heavy thunder and lightning, but none was observed after the gale set in heavy.

Many Boobies and other sea birds, King Fishers and Dragon Flies, were about the ship on the evening of the 25th. Did not experience any remarkable swell previous to the setting in of the breeze.

By a diagram which I made the day after, I consider the storm progressing to N. W. b. W. or perhaps more Westerly, about  $7\frac{1}{2}$  knots per hour.

*Abridged Extracts from the private Memorandum Book\* of Capt.*

THOMSON, Ship ENEAS, from Calcutta bound to Mauritius. Civil Time.

The *Eneas* had on the 22nd light variable airs from W. N. W. with hot sultry weather, and at noon was in Lat.  $19^{\circ} 55' N.$ ; Long.  $90^{\circ} 24' East$ ; Bar. 29.90; Ther.  $86^{\circ}$ . To midnight the same weather.

23rd April.—A. M. light airs N. E. very fine and smooth water. Noon, Lat.  $15^{\circ} 49'$ ; Long.  $91^{\circ} 01' East$ ; Bar. 29.80; Ther.  $86^{\circ}$ ; a current of 35 miles to the Eastward. A moderate breeze from North to N. E. becoming unsettled, from N. E. to S. East; cloudy.

24th April.—A. M. cloudy and lightning to the S. E. during the night. Constant heavy rain with unsettled weather and heavy swell. Lat. Acct.  $14^{\circ} 00' N.$ ; Long.  $90^{\circ} 38' East$ ; current allowed for; Bar. 29.70; Ther.  $81^{\circ}$ . P. M. increasing breeze at N. N. E.; from noon till 8 P. M. steered S. S. W.; at 8, S. W. Making all preparations for bad weather. Bar. at 3 P. M. 29.60; at 4 P. M. 29.50; at 6, 29.40; at 8, 29.38; at 10, 29.38; and at midnight 29.40; wind at midnight marked as a "moderate gale."

25th April.—At 2 A. M. sea rising very suddenly to a fearful height; too much sea to heave to; sails, both set and furled, blown from the yards, though the last were well secured. A kind of hard sleet almost cutting the skin. Wind unsteady with heavy gusts ending at S. East. Barometer at 2 A. M. 29.40; from which time it could no longer be seen in the ship's distress. At 2.30 A. M. two of the between deck ports were stove in and the vessel was nearly swamped with the quantity of water on her main deck. Ship on her beam ends and cabins boats and everything moveable washed away; ship settling down, cut away the main and foremasts, all hands baling and pumping and clearing wreck. Noon. weather still very heavy, wind South East decreasing with less sea to midnight.

\* In the distress and swamping arising from the ship's between deck ports having been beaten in, her log-book was destroyed.

26th April.—Fine. Clearing wreck, heaving cargo overboard, and fitting jurymasts and sails. Ship drifted about 13 miles to the N. N. E.

27th April.—Noon, Lat. Obs.  $12^{\circ} 47' N.$ ; Long.  $88^{\circ} 47' East$ ; clearing wreck and rigging jurymasts.

*Abridged Log of the Ship ATLET ROHOMAN, Capt. BURN, from Calcutta to Mauritius. Civil Time.*

23rd April.—At Noon, Lat.  $17^{\circ} 6' North$ ; Long.  $88^{\circ} 54' East$ . P. M. to midnight, light airs from North to E. N. E. and gloomy weather.

24th April.—To Noon the same weather, wind light at N. E. Lat. Acct.  $16^{\circ} 23' N.$ ; Long.  $87^{\circ} 54' East$ . Sunset breeze increasing from N. E. to 6 knots. Ship steering to the S. W. b. S.; at 8, Bar. 29.75; midnight fresh breeze, the same; Bar. 29.75.

25th April.—To Noon breeze increasing from N. E. b. N. with squalls and rain; at 8 A. M. all preparations for bad weather and hove to. Noon heavy gusts, Bar. from 29.75; at 4 A. M. to 29.57 at Noon. Wind veering occasionally to N. b. E. and N.  $\frac{1}{2}$  E.\* but for no length of time. Position as estimated by Capt. Burn at Noon Lat.  $14^{\circ} 24'$ ; Long.  $85^{\circ} 38' East$ ; P. M. Bar. 29.55 to 5 P. M. when gradually rising to 29.60 at Midnight. Wind N. N. E.; at 1 P. M. North; at 4, N. N. W.; at 6, N. West; at 8, when she bore up N. W.; N. W. b. W. at 9, and W. N. W. at 11 P. M. Midnight gale decreasing and fine.

26th April.—Fine breeze from West and W. b. N. Lat. at Noon  $12^{\circ} 49' N.$  Long.  $85^{\circ} 55' East$ ; Bar. 29.60 at 3 A. M. and 29.70 at Noon.

*Ship JOHN MACVICAR, Capt. N. MACLEOD, from Calcutta bound to Liverpool.*

I have not obtained this vessel's entire log, but an extract of it for 12 hours with a description of the hurricane appeared in a Liverpool paper and was copied into those of Calcutta. Omitting the letter to the Editor, &c. which accompanies it, the following is the log as given, with such additional information as can be gleaned from the description. This log is evidently kept in Civil Time.

\* A good instance of incurving.

*Ship* JOHN MACVICAR, 26th April, 1850.

H. K. F. Course, Wind,

1	8	S. S. W.	N. E.	<p>“At 2 A. M. commenced with fresh gale, dark cloudy weather and drizzling rain. At 4, increasing to a gale, with hard squalls and heavy rain, furling the mainsail, and double reefed the topsails. The Barometer falling very much, and the gale increased to a storm, with severe squalls and heavy rain, and the sea getting up mountains high. Furling the mizen topsail. Sounding the well constantly, but no apparent increase of water in it. At 10, a terrific sea struck the starboard quarter, and carried away the quarter-boat. At 11, increasing to a hurricane with an overwhelming sea breaking over fore and aft. Bar. and Simp. falling and now down to 29.10. Scudding in the hope of running</p>
2	9			
3	9			
4	9	4	N. N. E.	
5	8	4		
6	8	4		
7	8	4		
8	8	4		
9	8		North.	
10	8			
11	8		N. W.	
12	8			
Estimated, noon.				
Lat.		17.21' N.		
Long.		87.46' E.		
Bar.		29. 0'		
Simp.		28.90'		
Ther.		80. 0'		

out of it,\* at great risk of being pooped which finally occurred and was a second time repeated. At “the climax of the hurricane” (at 11 A. M. as marked in the log) a sudden shift of wind from North to N. W. broached her to and blew all the sails from the yards. Laid too on the starboard tack and at 4.40 P. M. the Bar. and Simp. began to rise and the hurricane to abate but the sea was still as high as before. Just as the Barometer began to rise we had terrific loud thunder and vivid forked lightning. The mizen mast was struck but not much injured.

*Abridged Log of the Ship DUKE OF WELLINGTON, CAPTAIN DUNCAN ;  
from Calcutta to London. Reduced to Civil Time.*

From the 17th April, 1850, when the Pilot left us until noon of the 21st, we stood to the S. S. E. and S. E. with light S. Westerly winds. Lat. at noon of that day 16° 50' North; Long. 89° 55' East; Bar. 30° 00'; Simp. 29° 80'; Ther. 84°.

On the 22nd April, we had light airs and hot sultry weather, wind veering from W. S. W. and N. W. to N. E. and East. Lat. Obs. 16° 15'; Long. 89° 42'; Bar. 30.20; Simp. 29.77; Ther. 86°. P. M. light airs and fine clear weather, towards sunset the sky to the Westward was covered with streaks of light hazy clouds of a deep red colour while the intervening sky was of a light green;† darkening in shade towards the horizon.

\* They were scudding to cross in front of it, and doing so too closely, as will be shewn in the summary.

† The green sky noted here was probably only what is called in optics the sub-

*Tuesday, 23rd April.*—A. M. light breeze and hazy weather, to Noon moderate breeze at E. N. E. and hazy weather. Lat. Obs.  $15^{\circ} 18'$ ; Long.  $89^{\circ} 26'$ ; Bar. 30.00'; Simp. 29.75'; Ther.  $86^{\circ}$ . P. M. light breezes and cloudy weather, wind E. N. E. to N. E. sky at sunset similar to the previous evening.

*24th April.*—A. M. fresh breezes and squally at times, wind N. E. Noon strong breezes and continued rain; double reefed the topsails; breeze increasing fast. Lat. by Acct.  $13^{\circ} 8'$ ; Long.  $88^{\circ} 49'$ ; Bar. 29.90; Simp. 29.60; Ther.  $83^{\circ}$ , wind N. N. E. At 1 P. M. gale increasing fast with a close threatening sky and continued rain. Bar. 29.85; Simp. 29.56; Ther.  $83^{\circ}$ . Securing for bad weather, *I judged now that we were in the left hand semi-circle of a Cyclone coming from the S. Eastward, the centre bearing from us E. by S. to E. S. E. and that a S. W. by S. course was the best to be adopted*, determined to carry all possible sail so as to run across the track of the storm before the centre could overtake us. At 4 P. M. the gale increasing, close reefed the fore and main topsails and furled the mizen topsail. Bar. 29.80; Simp. 29.50; Ther.  $83^{\circ}$ ; heavy squalls at times with incessant rain with a heavy sea from E. S. Eastward, wind at North. 6 P. M. wind inclining to Westward of North. Bar. 29.76; Simp. 29.46; Ther.  $84^{\circ}$ . At 8 P. M. gale still increasing; Bar. 29.80; Simp. 29.50; Ther.  $84^{\circ}$ . At 10 P. M. strong gale with hard squalls, assuming a very threatening appearance, heavy Northerly sea with a deep cross sea from E. S. Eastward. Bar. 29.79; Simp. 29.47; Ther.  $84^{\circ}$ . Midnight wind from N. W. to N. W. by N. blowing a heavy gale and the squalls still harder with continued rain (had several flashes of lightning from 10 P. M. to Midnight, to E. S. Eastward) Bar. 29.78; Simp. 29.43; Ther.  $84^{\circ}$ .

*25th April.*—At 1 A. M. squalls very severe with a tremendous sea; took in the fore and main topsails and scudded under the foresail and fore topmast staysail, wind being now at N. W. At 2 A. M. it cleared up a little and became more moderate. Bar. 29.72; Simp. 29.40; Ther.  $84^{\circ}$ ; the ship now scudding nicely under foresail, wind being at N. W. by W. At 6 A. M. the weather moderating and the sky looking much more settled, set the fore and main topsails. Bar. 29.78; Ther.  $84^{\circ}$ , wind W. by N. At 8 A. M. the weather continuing moderate made sail. Bar. 29.90; Simp. 29.60; Ther.  $84^{\circ}$ ; the wind at West  $\frac{1}{2}$  North. At Noon moderate breezes, the wind at West. Bar. 29.90; Simp. 29.60; Ther.  $84^{\circ}$ ; Lat. by Obs.  $10^{\circ} 47' N.$ ; Long. by Chr.  $86^{\circ} 51' E.$  which gives 75 miles current setting to N. W. by W. on the two last days' work, as calculated by dead reckoning. A heavy sea following us from N. by W. At 5 P. M. passed

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jective colour from the effects of the red clouds; but these accurate observations are of high value as shewing the care of the observers.

the ship "*Cowasjee Family*," standing to the N. Westward, he communicated to us by signals that he had experienced much bad weather.

26th April.—A. M. moderate breezes at S. W. by W. and cloudy weather, at Noon, ditto winds and clear weather the ship tumbling about with a heavy sea from the Northward. Lat. Obs.  $8^{\circ} 56'$ ; Long. by Chr.  $87^{\circ} 34'$ ; Bar. 29.97; Simp. 29.70; Ther.  $85^{\circ}$ . From hence we stood to the S. Eastward with light breezes from S. Westward.

Our position at Noon of the 24th was, by Acct. from the day previous, Lat.  $13^{\circ} 8' N.$ ; Long.  $88^{\circ} 49' E.$  But as we found we had been set to the Westward 60 miles at least, during the 24th and 25th (by the Noon Obs. of the latter day), I allow 20 miles set to the West during the 24th, as during the greater part of this day the weather was fine. Our position therefore on the 24th at noon would be Lat.  $13^{\circ} 8' N.$ ; Long.  $88^{\circ} 29' E.$ ; with the wind N. N. E. and close continued rain—this would give the centre of the storm E. S. E. distant say 150 miles: viz. the centre of its position would be Lat.  $12^{\circ} 14' N.$ ; Long.  $90^{\circ} 52' E.$  From Noon until 8 P. M. we ran S. W. by S. 60 miles, and from 8 P. M. to Midnight 35 miles, with a strong set to N. W. by W. I allow the course made good to be S. W.  $\frac{1}{2}$  S. 95 miles, from Noon until Midnight; the wind was then N. W. making the centre to bear from us N. E. and somewhat nearer than at Noon, as the wind had considerably increased and the squalls had become much more severe; say distant from us 120 to 130 miles. The centre of the storm would now be in Lat.  $13^{\circ} 27'$ ; Long.  $89^{\circ} 3'$  (only 37 miles to the North East of the ship's position at Noon)—and it would have travelled N.  $54^{\circ} W.$  at the rate of 11 miles per hour; coming from the North end of the Little Andaman in a direct line to Vizagapatam.

At 1 A. M. the centre of the storm would be in its nearest approach to us as the bearing of the centre from the ship's position then, formed a right angle with the track on which the storm was travelling, in confirmation of which the glasses were then at their lowest point and the squalls so severe, that I took the topsails in, fearing the yards might give way. And I felt satisfied that the storm was travelling to the North-westward, and was then at its nearest approach to us, and that every mile it travelled and every mile we sailed was increasing the distance between us, which proved to be correct; for by 2 A. M. the weather cleared considerably and was more moderate. I had not left the deck from Noon until this time, except when going down to note the glasses. I put a sheet of paper and pencil in a convenient place at Noon, when I judged we had got into a Cyclone, so that what I have stated was noted by myself and when observed; the appearance of the sky I could not make much note of as we had almost continued rain until towards midnight when it would clear a little. Between the squalls the sky at that time assumed a very threatening appearance;



the clouds were Nimbi and rising in dense volumes one above the other and of a light blue (or rather grey) leaden colour, we had some lightning from 10 o'clock until midnight of the 25th, but no thunder. I may have misjudged my distance from the centre but what I have stated otherwise was carefully observed, and with the course and distance run I was most particular.

*North Eastern Coast of the Bay.*

The H. C. Steamer *Enterprize* was at Akyab on the 26th April, her log states she had variable winds from N. W. to North round to East S. E. and S. S. E. with threatening appearances and drizzling rain.

On the 27th April, leaving Akyab for Calcutta, had a heavy sea from E. S. E. being at Noon in  $20^{\circ} 9\frac{1}{2}'$  N.; Long.  $92^{\circ} 12'$  East; Bar. 29.90; Aneroid 30.02; Simp. 30.00; Ther.  $82^{\circ}$ . Moderate and steady breezes from E. S. E. to S. S. East.

28th April.—Carried fine weather with a heavy chopping sea, now from S. W. Noon Lat.  $21^{\circ} 1'$ ; Long.  $89^{\circ} 16'$  East. Weather moderate and fine. Wind S. S. W. and fresh breeze.

The Post Master at Akyab says, in a report to the Principal Ass<sup>t</sup>. Commissioner.

On the morning of the 26th, the weather was cloudy with Northerly and N. W. winds, accompanied with rain at intervals. The Barometer standing at 29.87. At Noon, the wind veered round to the Southward and Westward and blew fresh, with heavy rain. The Barometer on board was falling, being about 29.80. At 3 p. m. the wind shifted to the South Eastward from which quarter it blew a very fresh breeze until 8 p. m. when it gradually decreased.

27th.—Daylight, the weather was fine but cloudy at intervals with moderate S. E. and E. S. E. winds. Bar. 29.90. I do not think in my opinion there was any gale at this place on the days mentioned in your letter, but from the very heavy sea on the Bar. I should imagine there must have been a gale to the Westward some days previous. Noon of the 27th, the weather was fine with moderate Southerly and S. West winds and has continued so since.

*Extract from a Weather Diary for April last, at Bulloah,\* forwarded by G. LATOUR, Esq. Deputy Collector.*

23rd April.—Wind N. W.

24th.—Wind N. W. to N.

25th.—Ditto N. E. and cloudy weather.

26th.—Ditto E. N. E. ditto and wind rising.

\* Near the mouth of the Ganges and Burrampooter. Lat.  $22^{\circ} 53'$  N. Long.  $90^{\circ} 59'$  E.; called also Noacally.

27th.—Ditto E. S. E. to S. E. and S. W. and back to E. S. E. blowing hard during the night.

28th.—Blowing a hard gale with heavy showers, wind veering to S. W. hard squalls. Gale breaks at noon from S. W.

Total rain, ..... 1 inch.

Elevation of Pluviometer, ..... 4 ft.

*Abridged Log of the H. C. SURVEYING BRIG KRISHNA, Lt. FELL,  
I. N. Commander; from the Island of Preparis bound to Calcutta.  
Civil Time.*

On the 24th of April, the *Krishna* was at anchor off the Preparis, leaving it at 8 A. M. and at Noon it bore S. 30 East, 10 miles. The weather was gloomy with light and variable winds from N. E. to S. E. and South. Bar. at Noon 29.94. P. M. dark and squally to the S. W. squall rising with a remarkable double arch,\* and the rim well defined. Midnight fresh breeze E. N. E. and gloomy with a swell from the South and lightning to the Eastward. Bar. 29.90; Ther. 83°.

25th April.—A. M. to Noon moderate breeze E. N. E. to East, with passing squalls and clouds passing from East to West with a long swell from S. S. E. Lat. 16° 53½' N.; Long. 92° 14½' E.; Bar. 29.86; Ther. 83½°. P. M. increasing breeze East, but clearing a little to the South East; a long increasing swell from the S. S. E.; at 8, dark threatening appearance to the S. Westward; Midnight, wind East, strong breeze with rain thunder and lightning. Bar. at 5 P. M. 29.74; midnight 29.79; Ther. 84°. Making preparations for bad weather.

26th April.—To Noon strong breeze East to E. S. E. to 10 A. M. when S. East, and at Noon S. E. b. E. dark, gloomy looking appearance to the Southward and S. S. W., with a heavy Southerly swell. Lat. Acct. 19° 19'; Long. by Chr. 90° 15'; Bar. 29.80; Ther. 85°. P. M. strong breezes S. E. at 7 P. M.; and South, and at 5 P. M. E. S. E. moderate, at 9 hard squalls heavy rain, thunder and lightning, wind S. E. during the squalls; Clouds flying very wild, the lower clouds moving East to West, upper ones South to North. Midnight fresh gale E. S. E. and high sea. Bar. 29.78; Ther. 84°.

27th April.—A. M. fresh increasing gale E. S. E. with a high sea, rain, lightning and distant thunder. Wind hauling to S. E., S. S. E. and S. b. W. at Noon; vessel having laid to at 3 A. M.; at Noon no observation. Bar. 29.69; Ther. 84°. 3 P. M. saw the Station Pilot vessel, after which a few heavy squalls till evening when the weather moderated.

\* These double arched squalls are often noticed in the Logs of ships on the approach of Cyclones.

*Abridged Log of the Ship ARDASEER, Capt. LOVETT, from Bombay to Calcutta. Civil Time.*

The *Ardaseer* was at Noon 25th April, in Lat.  $15^{\circ} 07' N.$ ; Long.  $82^{\circ} 54'$  East with light Northerly breezes and fine weather. Bar. at 29.70.

26th April.—Lat.  $16^{\circ} 2' N.$ ; Long.  $83^{\circ} 53'$  East; Bar. 29.58; fresh 7 knot breeze at N. W. b. W. with a tremendous sea; course N. E. b. N. p. m. breeze decreasing with a dark gloomy appearance and a heavy swell from the Eastward; at 4 p. m. light airs. Bar. 29.50, to 29.37 at 8 p. m. when dark and gloomy to S. East with a terrific swell, the ship pitching violently. Midnight Bar. 29.47.

27th April.—Breeze from S. S. E. and fine. Lat.  $17^{\circ} 05' N.$ ; Long.  $86^{\circ} 00'$  East. Bar. 29.70; Ther.  $87^{\circ}$ .

*Abridged Note from the Log of the Ship BELLE ALLIANCE, Capt. STEPHENS.*

This vessel on the 25th April, in Lat.  $16^{\circ} 30' N.$ ; Long.  $83^{\circ} 5'$  East; had her Bar. 29.73 (from 29.85 on the 24th); Simp. 29.45 (from 29.45 on the 24th); Ther.  $85^{\circ}$ ; very cloudy with an appearance of bad weather. Fresh wind at North with a very heavy sea from the N. East making the ship plunge very heavily. On the 27th, Southerly winds and fine weather.

*Extract from the Log of the Dutch Ship NEERLANDSCH INDIE, Capt. L. DELCLISUR, from Calcutta to Amsterdam. Civil Time.*

The *Neerlandsch Indie* left the Pilot at midnight 24th, 25th,—April, 1850; and from that time stood to the S. S. W. with winds from N. N. E. and cloudy weather with rain.

Noon 25th April by D. R. in Lat.  $20^{\circ} 8' N.$ ; Long.  $87^{\circ} 53'$  East. Bar. 29.93; Ther.  $86^{\circ}$ . Light winds from N. E. cloudy weather with rain; at 10 p. m. increasing wind with a rising sea: made all preparations for bad weather, and reduced ship to bare poles.

26th April.—At 3 a. m. the sea still increasing causing the ship to labour much, and to take in water over all. Shortly after, the sky from being slightly cloudy, became thick and dark and rising ahead, the Barometer still falling. In the morning at 4 o'clock it stood at 29.72; Thermometer 86, all of which taken together made us surmise that we were in the neighbourhood of a hurricane. Decided in consequence on laying to under close reefed main topsail with the starboard tack on board, her head laying S. E. Southerly. The storm increased speedily in power, so that at noon the sea was terrific. The seas were



coming on board from all quarters which caused the ship to labour most dreadfully, both ship and rigging suffering much. At Noon in Lat.  $18^{\circ} 4' N.$ ; and Long.  $87^{\circ} 22' East$ ; Bar. 29.2; Ther.  $86^{\circ}$ . Wind E. N. E. At 2 p. m. wind East, blowing heavily; at 3 p. m. the wind decreased suddenly to light airs first S. E. and from East and West alternately. Bar. 28.75; Ther.  $86^{\circ}$ ; which made us fear that we were in the centre of a hurricane; at 5 p. m. it again began to blow from W. S. W. with heavy rain, thunder and lightning, laying to the S. S. E. with the larboard tack on board under the same sail to steady the ship. At 7 p. m. the wind suddenly became so violent that the ship went over on her beam ends on the larboard side. Immediately on the bursting of the hurricane the storm fore staysail and close-reefed main topsail were blown away and the ship rose a little. The hurricane increased so much in intensity that all the topmasts and jibboom were carried away and fell overboard, remaining hanging by the rigging alongside the ship. The fore topsail yard had previously been broken in the middle. The violence of the wind was so great that nothing could be done, any verbal communication being rendered impossible.

At 9, the wind began somewhat to slacken although the sea still continued steadily to rise, several successive seas broke on board carrying away part of the bulwarks, ship in great distress and making much water, sky overcast with dark clouds, every thing together contributed to make this night one of the most dreadful to describe. As soon as the wind slackened, got a studding sail in the starboard mizen rigging under which we remained lying to. At 10 p. m. the Bar. had risen to 29.5; the Ther. remaining the same.

*27th April.*—At daylight wind decreasing but the sea high yet, began immediately to clear the wreck. At noon in  $18.2 N.$ ; Long. by Chr.  $87^{\circ} 59'$ ; Bar. 29.8; Ther.  $86^{\circ}$ .

*Sunday 28th.*—Clear weather light top gallant breeze from S. and S. W. fine weather.

*Abridged Log of the French Ship LA MEUSE, Captain HAUVET,  
from Havre bound to Calcutta, reduced to Civil Time.*

*25th April.*—A. m. a fresh 7 knot breeze from the N. E. (to which it had gradually freshened since noon of the 24th), with threatening appearance; making all preparations. Noon increasing and sea getting up. Wind about N. E. to N. N. E. Lat.  $17^{\circ} 1' N.$ ; Long.  $84^{\circ} 40' East$  of Paris;  $87^{\circ} 00' East$  of Greenwich. p. m. wind variable from N. E. and unequal in strength. Sea increasing. At 4 p. m. hove to. Wind N. East.

*26th April.*—A. m. heavy squalls and sea from N. East with dismal appear-

ances to Noon\* when Lat.  $18^{\circ} 24'$ ; Long.  $83^{\circ} 55'$  Paris;  $86^{\circ} 15'$  Greenwich. P. M. Wind North but variable; at 9 P. M. N. N. W. Midnight lying to under close-reefed main topsail, blowing a hurricane. At  $\frac{1}{2}$  past 7 P. M. a terrific squall with violent thunder and lightning in which it was impossible to be heard.

27th April.—A. M. wind about W. b. N. and at 5 A. M. west, decreasing rapidly to noon when in Lat.  $18^{\circ} 05'$  North; Long.  $85^{\circ} 12'$  Paris;  $87^{\circ} 32'$  Greenwich. P. M. wind is marked at S. West.

*Abridged Log of the Schooner JOSEPH MANOOK, Capt. H. HICKS, from Akyab to Calcutta, reduced to Civil Time.*

25th April, 1850.—At Noon Lat.  $19^{\circ} 53'$  N.; Long.  $89^{\circ} 30'$  East. P. M. wind N. E. b. N. course, N. W. b. N. moderate and fine, a 3 knot breeze decreasing at sunset with threatening appearances. At 7.30 P. M. a heavy squall from the Northward, increasing to a gale at Midnight from N. E. with every sign of bad weather, though the Bar. is at 29.80.

26th April.—At 10 A. M. wind marked N. E. b. E. 7.30 A. M. wore ship to S. Eastward. Noon weather as before. Lat. Acct.  $20^{\circ} 30'$ ; Long.  $89^{\circ} 10'$  E.; Bar. 29.90. 5 P. M. wind marked E. N. E. 8 P. M. hove to, wind N. E.; at 10 P. M. East, gale and sea increasing.

27th April.—1 A. M. wind S. East; 2, S. S. E. and 3, South; Noon S. S. W. vessel lying to with heavy gale and sea, lost our boat. Bar. at noon 29.40.; P. M. Bar. 29.36; at 8 P. M. moderating. A brig in company since sunset of 26th; proves to be the Tavoy, Pilot Vessel.

28th April.—Weather gradually becoming fine.

*Abridged Log of the Ship ROB ROY, Capt. J. FRANCIS, from Singapore towards Calcutta, reduced to Civil Time.*

25th April, 1850.—Wind N. Easterly and N. E. b. N.; at 4 A. M. steady breeze and cloudy weather freshening to Noon, when Lat.  $19^{\circ} 2'$  N.; Long.  $86^{\circ} 24'$  East. P. M. strong breezes and heavy sea with sharp squalls. Wind from E. N. E. to Easterly, and again E. N. E. at Midnight, when Bar 29.15.†

26th April.—Increasing breeze to strong gales with high sea; at noon wind from N. E. b. E. to N. N. E. Bar. 4 A. M. 30.10; at 10 A. M. 29.71; noon 29.70. Position not given, but the land had been seen; at 9.30 P. M. on the 25th distance about 6 miles. P. M. very strong gales N. N. E., heavy rain and

\* Mauvaise apparence tout a fait. Ciel allumé—(literally altogether bad appearances and “sky lighted up”) is entered here at 8 A. M. I suppose this alludes to the red sky, but I had not an opportunity of enquiring.

† 30.15 is probably meant since it must have fallen afterwards to 29.70 before Noon.

high sea, Bar. 29.67 to 29.00 at Midnight. At 7 P. M. wind North. At 11, blowing terrifically. Shifted cargo and ballast, lost boats and other damage.

27th April.—A. M. wind hauling to the Westward; 2 A. M. abating; at 4 A. M. wind W. S. W. Sea going down and gale fast abating. Noon fine weather. Lat.  $19^{\circ} 29'$  North; Long.  $87^{\circ} 06'$  East; Bar. 29.79.

#### ON THE COROMANDEL COAST.

The following is the Register of the Barometer and Thermometer at the Madras Observatory from the 23rd to the 27th of April.

Date.	Barometer.			Thermometer.		
	8 A. M.	4 P. M.	10 P. M.	8 A. M.	4 P. M.	10 P. M.
April 23rd.—	30.014	29.934	30.012	85.2	91.9	83.3
1850. 24th.—	—0.030	—0.886	29.935	82.6	92.1	83.7
25th.—	29.925	—0.830	—0.906	85.4	95.2	84.9
26th.—	—0.930	—0.830	—0.936	87.3	98.0	85.5
27th.—	—0.962	—0.884	—0.976	87.5	94.2	85.0

*Abridged Copy of the Note Book of Capt. SHIRE, Ship ISKANDER SHAW, from Cochin to Calcutta. The Log Book being lost in the severe gale, this begins from the 26th April, 1850.*

At Noon Lat.  $18^{\circ} 30'$  N.; Long.  $85^{\circ} 15'$  East; P. M. the weather seeming threatening (although the Bar. showed no indication of it being still at 29.70, the same as it had been during the past ten days), shortened sail, in reefs and down royal yards; tacked ship and stood to the Northward, but towards sunset finding that the angry appearance of the weather still increased, and our distance from land being very little, tacked again, and stood to the S. Eastward to gain an offing and guard against any set of current on shore in case a gale should come on, the wind being then at E. N. Eastward.

27th April.—At 2 A. M. the wind coming in strong gusts reduced ship to storm sail; the Bar. had now fallen to 29.60, and during the night we stood about S. E. at the rate of three knots, under the foresail and double-reefed main topsail lowered on the cap intending at daylight to send down the top gallant yards and masts. During the night the Bar. did not fall any more, but strange to say at 4 A. M. it again rose to 29.70; although at daylight still more gloomy and threatening; hauled up the foresail and laid her to, under close-reefed main topsail. Almost instantaneously the wind blew with an inconceivable fury and the sea rose in the like manner and with both came on torrents of rain; after several vain attempts to furl the foresail called the people down until the fury of the

storm was over, intending to send them up again when it had passed ; they had scarcely got on deck when we lost the Jibboom ; cut away the wreck and soon got clear of it, and we had no sooner done so then with a terrible lurch to leeward accompanied by a dreadful squall of wind and rain that actually screeched through the rigging as it passed, away went the whole three topmasts just above the caps with all their top hamper ; in their fall they carried away the fore and crossjack yard arms, and we had thus only the main yard left ; in the space of one hour from daylight from being all in trim and fair sailing condition we were reduced to a perfect wreck. The ship being now deprived of any sail to steady her rolled at times most terribly, all our efforts to secure the lower yards by guys, &c. &c., proved quite ineffectual. On again looking at our treacherous Barometer we found that now when the mischief was done it had fallen to 29.45 ; and we now to our sorrow found out also by the shifting of the wind to the N. N. Eastward that we had become involved in a circular tempest, and not as we first thought an ordinary gale, such as is usual about the full and change ; from the circumstance of the Barometer giving no warning, and also because we experienced no swell setting on shore which is always regarded as a sure precursor of such tempests. It was too late now to attempt to run out of it, as it would have been too hazardous to scud or do any thing else (excepting to lay to) at the height to which the storm had risen. Up to noon the same tempestuous weather continued ; carried away the starboard cutter. Lat. by Acct. 18° 00' N. ; Long. by Acct. 86° 10' E. From the noon of this day until midnight the gale or hurricane if possible more dreadful than at first ; indeed any measured description of it that we could give would fall far short of the reality experienced by us, and as the night closed in, there was no prospect that the vessel would live through the dreadful sea until daylight. She laboured and strained at such a rate that any vessel less strong must have perished in what she encountered, but happily at Midnight it began to break and had fallen to little wind.

28th April.—At daylight the prospect that presented herself was frightful. During the whole of this day the people employed, when the terrible violence of the storm abated at intervals, in cutting and clearing away the wreck.\*

*Abridged Log of the Ship ATALANTA, Capt. FARLEY, from Chooramun (Balasore) to Madras, reduced to Civil Time.*

At Noon, 25th April, 1850, in Lat. 19° 33' N. ; Long. 87° 38' East ; light breeze from East, and cloudy with small rain. P. M. wind E. N. E. (course S. S. W. 8' per hour) gradually veering to N. N. W. by 8 P. M. At 10, threatening weather.

\* Capt. Shire states that no lightning was experienced till at the close of the Cyclone, and then to the Southward.



*26th April.*—Daylight, increasing gale with confused sea. 11 A. M. wind suddenly shifted to the Westward with tremendous fury, carrying away the three topmasts and mainmast head, ship on her beam ends. Noon the same weather. Lat.  $16^{\circ} 10' N.$ ; Long.  $85^{\circ} 47' E.$ ; Bar. 29.40. P. M. hove to with a sail in the mizen rigging. At 3 P. M. Bar. 29.50. Lower deck cargo shifted, and ship almost swamped. Wind not marked from Noon this day.

*27th April.*—A. M. moderate and fine, bore up for Calcutta. Noon in Lat.  $17^{\circ} 11' N.$ ; Long.  $86^{\circ} 47' E.$

#### FALSE POINT PALMIRAS.

The following report is from Mr. Barckley, Superintendent False Point Light House.

*26th April.*—False Point was visited with a severe Cyclone. At noon it commenced to blow from the Eastward in heavy squalls, with heavy rain at times, and at 5 P. M. the wind veered to the S. E. and at 7 P. M. to the Southward, and at 9 P. M. to the S. W. and then the weather moderated; and fell almost a calm—

*27th April.*—To 2 30 A. M. with a very clear sky overhead and a very thick mist surrounding the horizon; at 3 A. M. it commenced to blow from the N. W. a complete hurricane until 5 A. M.

At about 2 A. M. the greater part of both Dodwell's and Plowden's Islands were inundated, and I should say that the water rose about 5 feet more than the usual rise; and it did not subside for about 9 hours after the Cyclone had blown over; and the wind steady at S. S. E.

I have been some twenty miles round to the different villages, there are no lives lost, but there is not a house left with a roof on, and a great many blown down altogether. These villages lie all to the N. W. of the Light House.

Five of the Company's Salt works are completely destroyed.

We have received a great deal of damage at the Light House. The Portico, bathing-room, and most of the men's houses blown down, and the garden laid a complete wreck, not a tree left standing.

In reply to my farther queries, Mr. Barckley adds the following notes and tables of the Barometer and winds at different hours.

"In answer to your note dated the 3rd instant, I beg to state that on the evening of the 25th there was a very thick haze all round the horizon, with a red appearance, and a cross scud overhead, from the N. W. and S. W. with the wind from the S. E. with a clear sky. On the 26th it was cloudy, and thick all over throughout the day; between 12 and 3 o'clock on the night of the 26th, there was heavy forked lightning from the N. W., and a clear sky overhead with a bright moon, and stars thinning."

*State of Barometer and Thermometer at False Point on the 26th  
and 27th April, 1850.*

APRIL 26TH.

Hours.	Barometer.	Thermometer.	Winds.
8 A. M. ....	29.80	80° 0	East.
10 A. M. ....	29.80	81° 0	East.
Noon, .....	29.78	82° 0	East.
2 P. M. ....	29.78	82° 30	East.
5 P. M. ....	29.78	81° 0	S. E.
7 P. M. ....	29.70	81° 0	South.
8 P. M. ....	29.70	81° 0	S. W.
Midnight, .....	29.60	80° 0	S. W.

27TH.

Hours.	Barometer.	Thermometer.	Winds.
2.30 A. M. ....	29.60	80° 0	N. W.
8 A. M. ....	29.60	79° 30	S. S. E.
10 A. M. ....	29.68	79° 0	S. S. E.
Noon, .....	29.73	80° 30	South.
2 P. M. ....	29.75	81° 30	S. by W.
5 P. M. ....	29.76	82° 0	S. by W.
8 P. M. ....	29.80	81° 0	S. by W.
Midnight, .....	29.80	80° 0	S. by W.

BALASORE.

*Statement of the Gale of the 27th April, 1850, with notes of Barometer and Thermometer from the 24th instant, by A. BOND, Esq. Master Attendant, Balasore.*

26th April, 1850.—Cloudy and threatening with light breeze from N. E. with slight rain at times, Barometer falling; 29.70 at 2 P. M.; at 5 P. M. 29.60, and every appearance of an approaching gale; ordered the Orissa's anchors out\* with a long range of chain, head and stern; at 9 P. M. breeze freshening with

\* A Government schooner stationed at Balasore.



S. S. W. to W. S. W. moderate.	{	20 miles W. S. W. of ditto, gale more moderate.
		40 miles W. S. W. of ditto, very moderate.
		26 miles S. b. W. of ditto, (Chooramun) moderate but stronger than to the S. W.
		50 miles S. W. of ditto (near Pt. Palmyras) heavy gale similar to Balasore N. to West.

Gale taking the range of the hills on their Northerly and Easterly side to Point Palmyras. Balasore being near to the Westerly edge of the Cyclone.

Gale ceased to the S. b. W. at 9 A. M.

N. B.—No gale close in to the hills, taking the direction of them, but 8 miles distant from them, from N. E. to S. b. W.

We had no lull at Balasore for more than five minutes, when the wind shifted westward with very heavy puffs.

*Rough notes of the direction of the wind during the Cyclone of 27th April, 1850, taken at the Dantoon Staging Bungalow, 10 miles North of Jellasore, Lat. 22° 02' N. Long. 87° 25' E. by Mr. THOS. CAMPBELL, forwarded by Mr. BOND.*

25th April, 1850.—2 P. M. fresh Easterly gales and rain continuing during the night.

At daylight 27th April, heavy gale from North East to East with much rain. At 10 A. M. as usual in these storms, there was a lull for about half an hour during which the wind shifted and the hurricane returned with terrific violence from S. S. West, accompanied by a deluge of rain gradually veering round to the Westward and breaking up about W. N. W. at 3 P. M. Height of gale between 11 and 12 A. M. of the 27th. Occasional thunder and lightning during the storm, but not severe.

No Barometer or Thermometer at hand.

*Abridged Letter from Capt. SPENS, B. E. Surveying Embankments at Hidgellee.*

DEAR SIR,—I was during the Cyclone at a Bungalow on the sea coast at a place called Diggea in Purgunnah Beercool. There are two bungalows here now and from time to time there have been others which have been destroyed by encroachments of the sea. Warren Hastings had a bungalow here. The climate is very fine during March, April, May, and until the rains begin in June. When rain falls to any amount it becomes subject to fevers. The Thermometer during the latter part of April last in a house without glass windows and quite open to the S. W. Monsoon, averaged 85° during the day and 78° or 80° during the night. The bungalows are generally called the Beercool bungalows and are about two miles S. W. of the Diggea Mohun.



There had been much rain on the morning and evening of the 26th April, and towards night it was accompanied by strong wind from the North East. This wind kept increasing until 3 A. M. of the 27th, when it became a hurricane, which continued blowing from the same direction for some time, viz. from the North East. Furious as it was at 3 A. M. it kept increasing in violence until between 8 and 10 A. M. when it had veered gradually round to the East, and a very few points to the South of East, and attained its height of violence. After which (although blowing very violently until 2 P. M.) it gradually diminished in force and veered round by the South to the South West, and became the usual South West Monsoon. It was fortunate that it began from the North East, as that kept the sea off the Coast of Hidgelee at first, and afterwards when the hurricane had attained its height or rather before the tide began to ebb, otherwise much more damage would have ensued to the bunds, and to the country by inundation.

I am inclined to think that the gale blew more furiously at Beercool than elsewhere, it certainly did so in comparison with what occurred to the Northward, but I have not information to allow of my making a comparison with its effects to the South.

The bungalow in which I was residing was situated within 100 ft. of the edge of a range of sand hills which here line the Coast. That portion of the sand hills on which the bungalow stands is  $13\frac{1}{2}$  ft. above the high Spring tide mark, but on each side of it the hills diminish in height about 2 ft. During the storm the sand in front of the bungalow was cut away as far as the bungalow at the South East corner, from which two small rooms were undermined and fell into the sea, and within 25 ft. at the South West corner the sea rose to a height of 11 ft. high and passed over the sand hills right and left of the bungalow which were of this height, and the spray was dashed into the verandah and rooms of the bungalow. As I said before, the ebbing of the tide came at a most opportune time to prevent the sea from getting over the sand hills in larger quantities and for a longer time.

The roof was denuded of thatch in many places and the violent moving of the whole frame of the roof cracked the five verandah pillars and pulled a tie-beam out of the wall. Every room except the N. W. bathing room leaked, and a large quantity of salt water had been dashed into all but this room. I momentarily expected the frame work of the roof to give way and fall in, but luckily the rafters and frame kept their places.

Two Out houses were blown down; roof, walls and all. A third, was very much injured, but managed to remain standing, though in a tottering condition.

The Government embankments were overtopped and breached in all directions between the Diggea Mohun and the Peechurbunnee Khall, and the country

flooded. A great number of cattle were drowned, but only a few people, at least I have only heard of 4 or 5.

To the Northward near the Russoolpore river in Purgunnah Magna Mootuk, the storm was by no means so severe, the sea did not rise more than  $7\frac{1}{2}$  ft. at most and only a small portion of land has been inundated in the neighbourhood of the Mozapore Khall where its embankments and those on the sea coast adjoining were not high enough.

*Special Report from S. RANSOM, Esq. BRANCH PILOT, Commanding  
H. C. P. BRIG TAVOY.*

I have incorporated the logs of the H. C. Pilot and Light vessels in the tabular statement as usual, but the following very graphic report from Mr. Branch Pilot S. Ransom will be found of great interest.

This gentleman was desirous of obtaining leave to make the experiment of starting from the Light vessel to cross in front of the Cyclone and run round it, as recommended in my Eighteenth Memoir (Journal Vol. XVIII. p. 912, *Practical Deductions, &c.*) but this permission could not be accorded to him, as it is indispensably necessary that the station and cruising vessels should keep as near their post as possible, and to the last hour, to assist or signalise to the inward bound traders should any approach the Sandheads at these dangerous times.

*Letter from S. RANSOM, Esq. BRANCH PILOT, Commanding H. C.  
P. V. TAVOY.*

On the evening of the 24th April, I had gone to sleep (on deck) with variable airs from West to North; at 1 A. M. of the 25th, I was awakened by what appeared to me a strong breeze, but on getting up to inspect it I found it not strong, but that it had a peculiar moaning sound, like wind through trees or old buildings, its direction about N. E. and the sky covered with a heavy leaden colored appearance, not an opening to be seen, occasionally a few drops of rain fell; of course I made up my mind to weigh and cruise, and not to anchor again until I saw the result of the weather. From daylight of the 25th to the evening, the wind continued coquetting from N. N. E. to East, with the same leaden appearance, I stood to the Eastward first and then P. M. to the Southward about 28 miles, as you will perceive by the log; but the glasses rising a little and the general appearances being better, induced me to retrace my steps, and at midnight I was laying to along side the Eastern Channel light vessel. 1 A. M. 26th, the weather became worse, by increasing gusts from the N. E. I now reduced canvas and determined to get an offing as fast as possible, as the weather could not be now mistaken, and the instruments were all gradually sinking. By daylight of 26th, it was blowing a gale from N. E.; I had now obtained a position

about 38 miles S. S. E. of the lower floating light, with a drift of 90 miles to the Westward, so laid to under a close-reefed topsail with my head to the S. E. fully expecting that if it was a Cyclone approaching that we should be completely in its track. Gladly would I have spanked away to the S. S. W. and endeavored "to cross its hawse" but I had no authority to go away so far from my station, and I felt moreover that with attention and sea room my light little Brig was equal to any weather. Our Barometers up to 8 A. M. of the 26th, showed no very great depression but continued to fall slowly, the weather gradually getting worse, and the sea rising fast in confused heaps, the squalls at times fearfully hard. Just at noon occurred one of the strangest spectacles I have ever witnessed since going to sea (upwards of 30 years) that is, from being in a gale of wind, and to all appearances increasing to a hurricane, we in an *instant* plunged into a space of beautiful weather. The sun shining, clear blue sky overhead, and not wind enough to keep the sails from flapping against the masts, this put me on my guard and I thought of your "treacherous calm or lull," it continued thus for about one and a half hour, the dark and dense masses which floated away to the N. W. and S. W. were frightful to look at, and put me in mind of a curtain being drawn up at a theatre, the glasses did not appear to be affected by this but continued to fall, as we drifted to the S. W. 2 P. M. sky overcast again and threatening appearances, more particularly from South to S. W. every now and then sharp flashes of lightning in that quarter, but no thunder. By midnight of the 26th, I consider the hurricane to have been fairly on; Marine Bar. 29.57; Aneroid Bar. 29.65; Simp. 29.56; from this to 3.30 A. M. 27th, the instruments fell to 29.37. 29.51 and 29.44, the wind blowing as hard as there was any occasion for, commencing about this time to veer from N. E. to East; at 4 A. M. it had gone round to S. S. E. the lightning and threatening appearances to the S. W. increasing; up to 5 A. M. the gusts were terrific enough to tear the masts out of the fine little Brig, but she breasted it under a close-reefed main topsail like a sea gull without shipping a sea or making any water; the glasses from 5 A. M. rose rapidly, and the wind going to the Westward of South decreasing in strength, I shaped my course for the "Pilot's Ridge" and struck soundings on it by 9 P. M. The Schooner *Joseph Manook* was in company with us during the worst part, and we could not but admire the ease with which she seemed to encounter it, under a close reefed spencer and a tarpaulin in main rigging as a balance. This Cyclone is earlier on the Sandheads than ever I recollect having them, and it was not attended by any "swell" though that which did get up with the breeze was enormous, but local, from the existing hurricane, and subsided with it, all the other signs were perfect and unmistakeable.

I add, to complete this valuable report, an extract from Mr. Ransom's Barometrical register.

*Table of Barometrical, Aneroid, Simpiesometer and Thermometer observations on board the H. C. P. V. Tavoy, commanded by Mr. S. S. RANSOM, B. P. 26th and 27th April, 1850.*

Date.	Time.	Ther.	Mar. Bar.	Aneroid.	Simp.	Wind.	Weather.	Aspect.	Observations.
Tuesday 26th April, 1850.	2 A. M.	82°	29.77	29.94	30.05	Strong N. E.	Squally.	Dense clouds.	It may be noted here that this is the first comparative registry we have on record of the three instruments in a Cyclone and that the results are as follow :— Marine Barometer fell in 25½. hours, ..... 00.40 Aneroid, ..... 00.43 Simpiesometer, ..... 00.61  And that though all were lowest at the centre of the Cyclone yet in the first 12 hours the fall was as follows :— M. Barometer, ..... 00.14 Aneroid, ..... 00.16 Simpiesometer, ..... 00.35 So that, as warning the Mariner of the approach of the Cyclone, the Simpiesometer appears to be, by far, the best guide. During the rise from 3½ P. M. to 8 P. M. the three instruments gradually approach each other, till at 8 P. M. there is only a difference of 00.01. between the amount of the rise, which may be due to errors of observation. I have treated at length of this comparative trial of the three instruments in a separate paper, and have there endeavoured to assign a cause for the difference. H. P.
	4	82	.70	.87	.05	..	Blowing and rain.	Cloudy.	
	8	84	.75	.89	29.94	..	..	..	
	2 P. M.	82	.63	.78	.70	Calm.	..	Dense cloudy.	
	4	82	.61	.76	.65	..	..	..	
	6	82	.65	.78	.66	East Gale.	..	..	
	8	82	.57	.65	.56	East.	Gale.	..	
	1 A. M.	80	29.41	29.59	29.50	E. to S. E.	Squally.	Fierce indeed.	
27th April.	2	80	.37	.53	.45	..	Hurricane.	..	
	3.30	80	.37	.51	.44	..	..	..	
	5	80	.40	.57	.50	..	..	..	
	6.20	80	.50	.66	.60	..	..	..	
	7	81	.54	.69	.64	..	..	..	
	8	81	.59	.78	.75	S. S. E.	..	..	
	10 A. M.	82	.68	.82	.79	South.	Hurricane.	..	
	2 P. M.	82	.70	.85	.79	S. S. W. Sd.	Moderating.	..	
	8	82	.80	.91	.83	S. S. W.	Good.	..	

the best guide. During the rise from 3½ P. M. to 8 P. M. the three instruments gradually approach each other, till at 8 P. M. there is only a difference of 00.01. between the amount of the rise, which may be due to errors of observation. I have treated at length of this comparative trial of the three instruments in a separate paper, and have there endeavoured to assign a cause for the difference. H. P.



N. B.—Since writing the foregoing I have seen Captain Biden's report on the gale which has occurred at Madras, one symptom of which reminds me of its being similar with us here—(i. e.) *no admonitory swell*, which induces me to think that both these gales have *settled down* suddenly upon us. I observed some days before the Cyclone of April last, that the upper strata of the clouds were sadly torn and distracted, whereas the lower ones were regular and going with the existing wind, the same appearances was presented at the Sandheads on the 23rd, 24th, and 25th May last. I merely mention this, as there is a curious coincidence in no swell having preceded either of the gales. S. R.

*Extract from a letter from Mr. W. AINSLIE, Officiating Collector of Balasore, to the Commissioner of Revenue for the Division of Cuttack, dated the 15th May, 1850; forwarded by G. FLOWDEN, Esq. Seey. Sudder Board Revenue, by order of the Board.\**

From the evening of the 24th April, the weather had been very threatening, with strong but unsteady breezes varying in strength, from E. veering to N. W. with rain, thunder and lightning, until the afternoon of the 26th, when it had again shifted to N. E. From this time which I consider the commencement of the Cyclone, the wind increased in force, gradually shifting to N. W. from which point it continued to blow with great violence, accompanied by much rain till 8h. 30m. A. M. of the 27th, (the Barometer had, at this hour, fallen to 28.69.) It then veered to W. its violence still increasing. The gale was at its height at 9 A. M. and continued with unabated fury till 11 A. M. when it began to decline and shifting to S. W. finally broke up. This storm exceeded in violence the storm of October, 1848, but was of short duration, and fortunately in a less unfavorable direction. Excessively heavy rain accompanied the gale to its close. The quantity which fell during the storm was very great, but as the Pluviometer at the office was blown away and broken there was no means of ascertaining it exactly. Indeed had the instrument remained uninjured, it would not have shown a quantity approaching to the actual fall on account of the violence of the wind. All the low ground in and about the town was flooded to the depth of several feet, the water flowing over the roads to the depth of a foot or more, as the bridges were inadequate to carry it off.

From reports received from the interior, it appears that the force of the storm was felt principally on the Coast from Dhamrah to Dusmulling. At this point the Coast trends to the Eastward and the storm passed inland, its Western limit being about in a line from Balasore to Bustah, inland, and to the S. of Balasore it did not prevail in such force as to cause much damage.

\* A few alterations have been made in this report, in accordance with an explanatory letter afterwards sent of which a copy was forwarded to me.

The reports from the Coast to the Southward describe the storm to have been similar in character and direction to what I have above described, while to the Northward, the gale appears to have veered from N. to E. and S. E. and finally broken up at S. Its general direction as indicated by the results was from S. to N. In consequence of this storm having occurred during the height of the spring tides, several parts of the Coast, especially near the mouths of rivers were inundated by the sea. Dhamrah, Bhograi and Kamardachour (at the mouth of the Soobunreka) suffered most in this respect. The reported loss of life is small, amounting to not more than eight or ten persons, and of these several were children crushed by the falling of walls. Three cases of death by drowning are included in these; the loss of cattle has been considerable, about 250 to 300 are said to have been drowned by the inundation, principally those in Dhamrah, besides these many are said to have been drowned by being driven by the West wind into the sea, the number of these is estimated at 400 to 500, but this is probably greatly exaggerated.

*Extracts from a letter from H. BAILLIE, Esq. M. D. Civil Surgeon and Salt Agent at Hidgellee, forwarded by C. BEADON, Esq. Secy. Board of Salt and Opium.*

The day previous to the storm of the 27th ult., the wind was light and Easterly, the afternoon of that day we had drizzling rain which increased towards night. About 5½ o'clock the morning of the gale it was raining, and the wind even then blowing with unusual force from the East, it gradually increased in violence till about 9 o'clock, when it raged a perfect hurricane. At intervals of a few minutes, a blast would pass, shaking the walls of the house I was in, this state of matters continued till past eleven when the wind shifted to the South, and later in the day to the South West, where it settled. So soon as the wind changed its course from the East, the decrease of its force was plainly perceptible; still, even when South Westerly, an occasional gust would occur.

From subsequent examination of places in this district which were subjected to the influence of the Cyclone, I assume that it was severest in Beercool Pergunnah, which lies to the South West of Contai, this opinion is strengthened by the following circumstance; that of the three ghauts\* of this agency, the greatest amount of injury to buildings happened at Ramnuggur. The *golahs*† at all these depôts are constructed of similar materials, are of about the same size, and situated alike, having their ends North and South, and their flanks East and West, so that the extent of surface offered by them to the wind would be nearly equal in each instance.

At Russoolporc, 8 miles E. N. E. of Contai, no damage to the *golahs* was experienced.

\* *Anglice*, places for embarkation. † *Golahs*, store-houses.



At Kissennuggur, 6 miles S. W. by S. of Contai, the thatch was in many places blown away, and a few bamboos broken.

At Ramnuggur, 16 miles S. W. by W. of Contai, five golahs (placed side by side) were more or less unroofed, the one to the East entirely uncovered, besides having many of its beams displaced, or blown down, the golah next to it less damaged and that nearest West, received the least injury.

As to the height of the wave or waves by which the country was inundated, I am unable to speak positively, but judging from the marks of the tide on the Megna a great sea bund, nearly opposite Contai, and portions of it which have been overtopped, I should imagine that a body of water of not less than six feet or more than eight feet in depth must have rolled over the salt lands outside the bunds, the tide was just about to turn when the wind shifted Southward, but for this providential circumstance the loss of life and property would have been infinitely greater. It is singular that to a similar shift of the wind does Mr. Barlow (in a letter to the Board) attribute the comparatively slight loss sustained by the gale of April, May, 1840, but on that occasion the flood was just setting in when the wind changed. I notice also from the same source, that the gale occurred (as in this year) during a spring tide. Capt. Spens, who is here on survey duty, was at Diggia in Beercool, occupying Mr. Dick's bungalow at the time of the gale, and from observations and measurement he considers that eleven feet was the height of the wave at that place, though the spray might have increased its apparent height by about two feet.

#### BARQUE CHAMPION at Saugor from MR. MASTER PILOT

G. B. SMART.

*Thursday, April 25th.*—From Fultah to Kedgerree. First part, light North-easterly wind, middle, light from East with a few heavy clouds to the N. N. E. latter part blowing a strong breeze from East, with a dirty slaty appearance to the N. N. E. and East like heavy rain; Barometer 29.80; when the sun set, the clouds to the Westward had a deep purple appearance, which led me to believe we were going to have a gale from that quarter: throughout extremely hot.

*Friday, April 26th.*—From Kedgerree to Saugor Flat Buoy. First part blowing hard from N. E. to East with the slaty appearance all round, but much thicker to the Eastward, the clouds appeared to be stationary with peculiar gusts of wind; 8 A. M. Bar. 29.80; about the middle of the day at times almost calm; squalls commenced from N. E. with heavy rain; 8 P. M. Bar. 29.72; observed a little scud flying so low that it appeared to almost touch the mast-heads; squalls much harder from E. N. E.; Midnight Bar. 29.69; very thick slaty appearance all around but most to the Eastward.

*Saturday, April 27th.*—At anchor at the Saugor Flat Buoy. Daylight Bar. 29.51; blowing very hard; squalls from East to E. S. E. much scud flying at a

tremendous rate; 9 A. M. Bar. 29.50; blowing a heavy gale from S. E. to S. S. E. with tremendous hard squalls and rain. Noon Bar. 29.54, a hard gale from S. S. W. the clouds over head fast clearing away; 3.30 P. M. much more moderate, Bar. 29.60; 8 P. M. hard monsoon breeze from S. S. W.; Bar. 29.67.

The following notice was inserted by me in the *Calcutta Englishman* of Saturday, 27th April.

We had a heavy, oppressive, calm day on Friday, which had much the feeling of an approaching Cyclone, but the Barometer still remained high, so that all which could be said was, that if one existed in the Bay it was only coming towards us. This morning however a little after midnight the wind rose in squalls, with rain from the North East, and then gradually increased in strength till 10 A. M., when the wind, which was North East, and at times N. E. b. E. with squalls at daylight, had veered to East and E. b. S., and at noon it was E. S. E. still blowing and raining in smart and heavy squalls, showing that the Cyclone had not passed far from us, but was already to the Westward of our meridian. The remarkable part of this Cyclone, however, is that the Barometer has scarcely fallen, having only been at 29.77 at 9 A. M.; and still more remarkable, the Simpiesometer has been always higher than the Barometer by .02 or .03 up to Noon, when we are writing for our evening paper with the Barometer at 29.64; Thermometer 82 $\frac{1}{4}$ . From all this we should infer that a Cyclone of small extent, but of considerable violence, has passed upon a track from about E. S. E. to W. N. W., or say from Akyab to about Hidgellee, near which place, or to Point Palmiras, its centre has probably passed. We shall look with much anxiety for the accounts from Kedgerie and Balasore during the next week, as well as to those from Midnapore; for to judge of the track by the strong Southerly squalls up to 4 P. M., the Cyclone has probably curved up towards Midnapore and Bancoorah in the latter part of its course.

#### CALCUTTA.

The following are my own notes at Calcutta, they are far less perfect than I could have wished them to be, but I was obliged to be absent from home on public duty, and was otherwise indispensably engaged during the whole day.\*

\* I wish it indeed to be understood that these memoirs, and the whole of my labours in this branch of science, are the fruits of a careful economy of my few leisure hours and often of privations of sleep and of due recreation. And this will perhaps explain to those who would desire them more perfect why, though fully conscious of their imperfections, I have been unable to render them more complete, and investigate at greater length, and by experiments and serial observations, many questions which are yet obscure. I have no time myself, and I have not the means to employ an assistant.

*Calcutta, 26th April, 1850.*—A heavy close calm day. Sky mostly covered with a dense mass of clouds, strata and cumulo-strata with nimbi; slight falls of rain in minute drops at intervals. The feeling of the weather was oppressive in the extreme, and exactly that of the “earthquake weather” of the Spanish Colonies; Bar. at noon 29.85.

*27th April.*—At Midnight it became squally with rain from the N. E.; at 2.30 A. M. blowing strong in squalls, with heavy rain; at 6 A. M. strong squalls with intervals of calm. Wind N. E. Sky clouded all over and below a dark, loose, smoky scud, flying pretty fast from N. East to S. West the upper clouds moving to about West. Some distant thunder but no lightning. Bar. 29.77; Simp. 29.80; Ther.  $81\frac{1}{2}^{\circ}$ ; 9 A. M. Bar. 29.77; Simp. 29.81; Ther.  $82^{\circ}$ . Short squalls at intervals E. N. E. with heavy rain, then nearly calm; lower scud from East or even E. b. S.

By  $10\frac{1}{2}$  A. M. wind E. S. E.; Bar. 29.78; Simp. 29.81. Scud from E. S. E. Heavy rain at intervals. At noon no observations.

3.25 P. M. wind S. S. E. in heavy squalls; Bar. 29.70; Simp. 29.72; Ther.  $82^{\circ}$ . Scud from due South, and throughout always distinct from the upper stratum of cloud. I should judge now that the centre may be about Midnapore and that it is a Cyclone which has curved up from the South.

At 3.50 P. M. wind South. A very singular phenomenon now took place which I have noted as follows: the observations being made from the terrace of my house at about 45 feet above the ground, and with an uninterrupted view of the horizon on all sides. “Ridges of black cumuli to the Westward and a low bank of black nimbus to the East, but from the South to the Zenith and thence to the North, a clear arch of open (but *not* blue) sky was seen which might be about  $50^{\circ}$  in breadth. The colour of the clear sky was a kind of purple, or rather a black blue, for there was no shade of red in it, yet though clear it could not be called blue. This appearance is as if we saw a part of the uplifted edge of the Cyclone or the Monsoon forcing its way up below it.”

At 4.30 P. M. Bar. 29.68; Simp. 29.74; Ther.  $82^{\circ}$ . Hard squalls from South. N. B.—From 12 to 4 P. M. blowing harder than from 8 A. M. to 12.

At 7 P. M. Wind S. b. W. squalls moderating. Clouds in long ridges from the S. Westward to the N. Eastward. The opening before described now from S. S. W. to N. N. E.\* and a dark bank of nimbus still to the Eastward. Bar. 29.72; Simp. 29.78; Ther.  $82\frac{3}{4}^{\circ}$ .

8 P. M. Bar. 29.74; Simp. 29.81; Ther.  $82\frac{1}{4}^{\circ}$ . A strong Monsoon gale in squalls but no rain, by midnight fine weather.

*From Mr. W. SINCLAIR, Midnapore.*

For several days before the 27th it became frequently very cloudy, the wind blowing rather steadily, or with very little variation from the south; and we

\* Which would be the direction of the S. Eastern edge of the Cyclone.

could often see clouds passing at a distance from us, and the rain evidently falling from their edges, there was lightning and thunder, but no rain at this station. At length on the evening of the 26th April, we had a drizzling shower, which continued all night attended with occasional gusts of wind; in the morning it blew furiously from the North East, the rain falling nearly in a horizontal direction; the violence of the wind tore down trees by the roots, and unroofed many bungalows and huts, at least such part of the bungalows as were thatched. About afternoon the wind shifted to the South East, blowing with the same violence, and doing the same injury. During the night it veered to the West with the same force, sometimes increasing, and died away in the morning.

*From the Calcutta Englishman.*

*Midnapore, April 29th.*—"The station of Midnapore was visited on Saturday last, by a terrific Cyclone. On Friday afternoon, (the 26th,) the clouds looked heavy and lowering, and about 10 P. M. rain began to fall. It continued till 3 A. M., when it was accompanied by gusts of wind from N. E. The wind increased in violence, and about 6 A. M. shifted to the East, from which quarter it blew with unabated fury till 12 o'clock (noon), it then veered to the South, its fury still continuing, and ultimately came round to S. W. at 3 P. M., at which point it gradually subsided.

"The station is a perfect wreck; not a house, European or native, has escaped injury. Some have been totally unroofed, the walls of others have been thrown down, and the windows and doors blown in, hundreds of trees have been rooted up, and those that remain standing have been stripped of their foliage, and their branches broken and twisted into all kinds of fantastic shapes. In the park no less than 140 of the oldest peepul and banian trees have been torn up and prostrated. You cannot picture to yourself the scene of desolation that surrounds us. It is, however, a matter of congratulation that no lives have been lost. Had the Cyclone come upon us at night there is no saying what fatality might have awaited us, and how many casualties we might have had to record. We have received no tidings from the South, and await them with some anxiety, as the wind blew strongest from that quarter; it is to be feared that the Hidgelee division has suffered severely, and that the sea has destroyed the bunds. You are right, I think, in your inferences as to the track of the Cyclone, its passage was from the South or S. W., and Midnapore was about its centre."

We shall be obliged to any friends who will kindly forward us their observations on the force, duration, and direction of this storm wherever it may have passed.



*Abridged note from G. W. CHEEK, Esq. B. M. S. Civil Surgeon of  
Bancoorah.*

On the night of the 26th we had drizzling rain, and in the night one or two showers; at 4 A. M. on 27th a little thunder; at daylight on the 27th, we had rain with puffs of wind from the Eastward; by 8 A. M. the wind had come round to the N. Eastward more violent with frequent showers; at noon the wind was North and increasing, with heavier falls of rain; at 2, the wind was North North West and very violent and continued increasing till 5 P. M.; but at 6 P. M. it was a little more Westerly and from that time gradually decreased in violence, and at 12 at night all was quiet. I never saw a more violent gale here, it was much worse than in 1842, still the gale was worse to the S. East of this towards Basserpore, Thotulpore, Amdanga, and in the Mirzapore direction.

Due South in my range of factories it was also very violent. To the West and North West 15 miles from this they only had rain; none of my factories in the North West or West complain of wind; while in other quarters nothing but reports of roofs and manufacturing houses being destroyed have come in. In my compound upwards of twenty large trees were torn up by the roots.

I have heard that at Soonamooky and Burdwan the storm was very violent, the rivers in this part were full and at Soonamooky flooded much land.

*Dr. CHEEK has also kindly obtained for us through J. W. MACTIER, Esq. C. S. the Magistrate of his district, the following reports from native Darogahs (Police Officers) at various stations. They are entitled "Reports of Darogahs relative to the hurricane of the 27th April," and all relate to that day.*

*Ragunatpore.*—High wind nearly from E. to N. rain very heavy.

*Chatra.*—Hurricane began N. W. then S. and ended S. E. heavy rain, storm at its height from 11 A. M. to 2 P. M.

*Condah.*—Hurricane, commenced N. N. E. then N. then W. then N. at which it died away; at its height from the N. from 9 to  $\frac{1}{2}$  past 4 P. M.

*Bishenpore.*—Commenced about 3 A. M. from N. then E. then round to S. heaviest from noon to 8 P. M. At times blowing from all points, damage done very great; at this place the storm was greater than any part of my district.

*Kotulpore.*—Cloudy during the whole night; towards morning a drizzling rain and wind from N. N. E. then N. then E. when at its height; then S. at which it died away; at times when at E. it blew what the natives call "bindal" i. e. whirlwind.

*Gomangelilie.*—Not very heavy; commenced N. E., then N. when at its height then to S. when it died away.

*Sitta*.—Commenced N. E. then N. when at height; then W. then S. once it blew a “bindal.”

*Soonamooky*.—Highest from the N.

*Cherulia*.—Does not appear to have been visited, there was a light wind from the N.

*Niamutpore*.—Commenced E. not heavy until 1 P. M. when it blew from the N. then W. and ceased at S.

*Cokerah*.—Commenced at W. then to N. to S. W. then to S. (does not appear to have been so heavy as in the Southern Thannahs).

*Sendpahani*.—From W. then N. then S. (does not appear to have been heavy).

*Cosgaon*.—Commenced N. E. then to N. when at its height, and blowing sometimes from all quarters, then to W. and declined Southerly.

*Potena*.—Commenced E. then N. when at its height, then E.

The duration in all the Thannahs was from 3 A. M. to 8 P. M.

The reports are all meagre, some of the Darogahs have been candid enough to tell me they were afraid to stir out.

From the above it would appear the centre was somewhere between Cosgaon and Potena, travelling N. to the E. of Soonamooky, and passing between Kotulpore and Bishenpore close to the latter.

*From Barrackpore by Mr. JAS. SMALL.*

Particulars of the gale of the 27th April.

At 4½ A. M. it blew hard from N. E. by E.; at noon S. E.; at 6 P. M. S. W. by S. and up to the hour when I retired (10½), I could perceive no farther change in its direction. Yesterday morning, the wind was Westerly. and scarce amounted to a fresh breeze. During Saturday, the only lull I noticed (and it was not very perceptible) was between 10 A. M. and noon, Throughout the day it blew in gusts, but I fancy this is generally the case on land, although my attention has not been given to the subject. It rained frequently during the earlier part of the day, but there were no showers after one or two o'clock.

*From Berhampore, by Capt. W. S. SHERWILL, B. N. I. Revenue Survey.*

*Saturday, 27th April, 1850.*—8 and 9 A. M. cloudy, heavy clouds drizzling rain, light wind from the *East*. 7 P. M. or sunset, heavy showers of rain with strong gusty wind from the *East*, heavy low scud flying across the heavens; a few flashes of lightning, distant and indistinct; no thunder; 8 to 11, wind increasing still from the *East*, a strong gale with heavy rain.

*28th Sunday.*—12 to 2 A. M. storm at its height; blowing furiously from the *East*; a deluge of rain; more water falling in these three hours than apparently



generally falls during the whole of an ordinary rainy season! The station is surrounded by and incloses numerous large tanks and jheels; these reservoirs had not been so full for many years as they were after this one storm; 3, sudden and dead calm; 4, calm; 5, sudden and strong wind from the *West* with light rain; thick overcast weather; 6, blowing hard from the *West*; 7, moderating; 8, calm, or rather light airs from the *West*; 9, fine weather.

*N. B.*—No Barometer, no Thermometer at hand, nor Pluviometer, all of which I regret much.

*P. S.*—Rampore Baulea on the Ganges was visited by the same storm, blowing over trees, &c. Several trees were damaged at Berhampore.

*Another letter from Berhampore forwarded to me by GEO. DALY, Esq.  
House Surgeon, Medical College.*

I beg to send you an extract of a letter from a friend of mine at Berhampore, where the gale appears to have been felt with great violence but only for a short time on the night of the 27th ultimo, the letter is dated the 28th April, and the writer says:—

“We had a fearful gale last night, which shook our house (a large brick building) to its very foundation. Indeed such was the violence of the wind that I had serious apprehensions about the stability of the Eastern wall; at 11 o'clock, P. M. when the storm attained its greatest degree of violence the whole Eastern side of the building vibrated so fearfully that I fully expected to see it come down. The wind was directly East and blew with such tremendous force that all the doors and windows were forced open, in spite of all our attempts to barricade them up with furniture and everything else we could collect, so that at last we were compelled to take shelter in the other side of the house and wait the result in trembling anxiety.

I do not remember so severe a gale in India since 1842. Fortunately it was not of long duration, it only lasted four hours, commenced about 8 and subsided suddenly at 12 o'clock. It has caused great damage to the gardens, large trees were blown down like reeds, and were it not for the high wall to the Eastward of our compound I verily believe we should have been blown away house and all. The wind was due East throughout.

It is calm this morning, but the sky is covered with drift having very much the appearance of a Scotch mist, so that we may not be quite done with it yet.

*P. S.*—2 P. M. No return of the gale, the sky is clearing up a little and the wind has veered round a point or two to the South.”

The following are tabular views of the winds and weather as experienced by the ships and residents at the stations on different days, to bring into one view the various states of the weather, and assist to explain the Chart.

TABULAR VIEW OF THE WINDS AND WEATHER IN THE BAY OF BENGAL, 22ND TO 27TH APRIL, 1850.

<i>Date.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. East.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Simp.</i>	<i>Ther.</i>	<i>Remarks.</i>
1850. 22nd April.	Iron Gem.	6° 47'	87° 49'	P. M. blowing fresh in heavy squalls from N. N. W. force (7) to (6.)	..	..	..	11 P. M. lost main piece of Iron rudder, ship standing to the Northward.
	Cowasjee Family.	9° 21'	90° 03'	S. E. to East to Noon N. b. E. P. M. moderate E. N. E. 6 P. M. to Midnight N. E.	..	..	..	Squally at times. Ship standing to the N. N. W.
	Æneas.	16° 55'	90° 24'	Light variable airs W. N. W. to Midnight.	29.90			
	Duke of Wellington.	16° 19'	89° 42'	Light airs W. S. W. N. W. and N. E. and sultry. P. M. clear and red clouds.	31.20	29.77	86°	

<i>Date.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. East.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Simp.</i>	<i>Ther.</i>	<i>Remarks.</i>
1850. 23rd April.	Iron Gem.	6° 40'	88° 25'	Wind N. W. to N. N. W. at Noon, (7) to (8) P. M. (9) and W. N. W.	..	..	..	Moderating a little A. M., after which more violent. P. M. terrific squalls. Ship hove to.
	Cowasjee Fa- mily.	11° 45'	88° 24'	Strong N. E. breeze and dark gloomy weather with squalls P. M. N. East.	29.76	..	..	Moderating at 9 P. M. but increas- ing again at Midnight. Ship standing to the N. W.
	Brig Nereid.	16° 10'	90° 11'	Light winds Westerly to N. W. and fine.	29.85	..	87°	
	Aeneas.	15° 49'	91° 01'	A. M. light airs N. E. fine and smooth water. P. M. moderate from N. to N. East.	29.80	..	86°	P. M. weather becoming unsettled from N. East to S. East.
	Duke of Wel- lington.	15° 18'	89° 26'	A. M. light breeze and hazy. Noon moderate at E. N. E. P. M. light E. N. E. to N. E.	30.00	29.75	86°	Sky as on the 22nd.
	Atlet Rohoman.	17° 6'	88° 54'	P. M. to Midnight light airs from North to E. N. E. and gloomy weather.				

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Simp.	Ther.	Remarks.
1850. 24th April.	Iron Gem.	6° 37'	88° 40'	Veering to N. W. b. W. and Westerly. P. M. West. Noon force (9) P. M. (4) to (7.)	..			
	Cowasjee Fa- mily.	12° 41'	87° 52'	A. M. N. E. 6 A. M. N. N. E. 10 North. Noon hurricane from 9.30 A. M.; thunder. P. M. N. b. W. 3 N. N. W. 5 N. W. b. N. 8 N. W. Midnight W. N. W.	..	29.58	..	At 9.30 A. M. bore up and scud- ded S. S. W. wind North, Sim- piesometer does not appear to act. P. M. hurricane and dreadful thunder with deluge of rain. 8 P. M. weather moderating. High sea from the Northward.
	Brig Nereid.	14° 50'	89° 20'	Light winds N. N. E. and cloudy (3-4.) P. M. light baffling winds shifting suddenly from all quarters. 1 P. M. wind N. E. in- creasing 4 P. M. N. N. E. (5.) 8 P. M. N. N. E. (8.) Midnight N. N. E. (9.)	..	Noon 29.80 4 P. M. 29.75 8 29.65 Mid. 29.58	87°	P. M. thick rain, thunder and light- ning. Ship running to the S. S. W. Midnight sea rising fast.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Simp.	Ther.	Remarks.
24th April. con- tinued.	Æneas.	14° 00'	90° 38'	To Noon cloudy and un- settled weather and hea- vy swell. P. M. increas- ing from N. N. E. Mid- night moderate gale.	29.70 3 P. M. .60 4 .50 6 .40 8 .38 10 .30 Mid. .40	..	81°	Lightning to the S. E. during the night. Noon to 8 P. M. steered S. S. W. at 8 S. W.
					29.90 1 P. M. .85 4 .80 6 .76 10 .79 .78	29.60 .56 .50 .46 .47 .43	83° 83° 83° 84° 84° 84°	By 4 P. M. heavy sea from E. S. Eastward. 10 P. M. deep cross sea from E. S. E. Flashes of light- ning in the E. S. E. Ship scud- ding to S. Westward.
	Atlet Rohoman.  H. C. Survey- ing Brig Krish- na off Preparis.	16° 25'	87° 54'	To Noon light airs, sunset increasing N. East.  Light winds N. E. to S. E. and South and gloo- my. P. M. dark and squally to S. W. Mid- night fresh breeze E. N. E.	8 P. M. 29.75 Mid. 29.75  29.94  Mid. 29.90	..  ..  ..	..  ..  83°	Ship steering to the S. W. b. S.  Noon, Preparis S. 30 East 10 miles; squalls with double arch. Swell from South lightning to East- ward.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Simp.	Ther.	Remarks.
1850. 25th April.	Iron Gem.	60° 51'	88° 52'	West force 9 to 3.				
	Cowasjee Fa- mily.	90° 45'	87° 10'	Moderating and clearing up Noon W. S. W. P. M. moderate W. S. W. monsoon.	...	..	..	Resumed course but unable to carry sail from the high confused sea mostly from the Northward.
	Brig Nereid.	120° 40'	88° 27'	3 A. M. N. N. E. (9.) 4 A. M. N. E. to N. N. E. (10.) 5 N. N. E. 5 (10.) 6 N. N. E. (11.) 8 North (11.) 10 N. 8 N. W. (11.) 11 N. W. 10 b. W. (10.) Noon hea- vy gale W. N. W. 4 Noon P. M. W. b. N. (9.) 6 West. Moderating; 8 W. S. W. (8.) Mid- night W. S. W. (7.)	3 A. M. 29.41 4 .35 5 .30 6 .28 8 .28 10 .28 11 .30 Noon .31 4 .45 8 .60 Mid. .63	..	..	A. M. sea high but regular. Scud- ded to S. S. W. 5 A. M. hove too 8 scudded again. Noon hurricane in very heavy squalls at short in- tervals. 6 P. M. breaking up; 8 stars visible.
	<i>Æneas.</i>	..	..	At 2 A. M. hurricane; very unsteady gusts ending at S. East. Noon S. East decreas- ing.	2 A. M. 29.40	..	..	2 A. M. heavy sea rising all at once. Hard sleet and rain, vessel nearly swamped and masts cut away. Noon less sea.



<i>Date.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. East.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Simp.</i>	<i>Ther.</i>	<i>Remarks.</i>
25th April. con- tinued.	Duke of Wel- lington.	10° 47'	86° 51'	1 A. M. N. W. very severe squalls. 2 P. M. clearing up a little and more moderate; 6 A. M. W. b. N. moderating to Noon. 8 W. $\frac{1}{2}$ N. Noon West.	2 A. M. 29.72 6 .78 8 .90 Noon .90	29.40 .50 .60 .60	84° 84° 84° 84°	At 8 A. M. made sail.
				To Noon increasing N. E. b. N. with squalls and rain in heavy gusts. 1 P. M. N. N. E.; 4 North. 6 N. N. W.; 8 N. W. 9 N. W. b. W.; 11 W. N. W. Midnight decreasing and fine.	4 A. M. 29.75 Noon .57 1 .55 5 .60	..	..	At 8 A. M. all prepared for bad weather and hove to. Wind veering occasionally to N. b. E. and N. $\frac{1}{2}$ E.; At 8 bore up.
				Noon moderate breeze E. N. E. to East. P. M. East. Midnight East strong breeze.	29.86 5 .74 Mid. .79	..	83½° 84°	Clouds passing from East to West long swell from S. S. E.; 8 dark and threatening to S. West. Midnight rain thunder and lightning.
				Light Northerly breezes and fine.	29.70			
	Ardaseer.	15° 07'	82° 54'	Very cloudy with appearance of bad weather. Fresh breeze at North and heavy sea from N. East.	29.73	29.45	..	Bar. on 24th 29.85 Simp. 29.43 On the 27th fine weather.

<i>Date.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. East.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Simp.</i>	<i>Ther.</i>	<i>Remarks.</i>
25th April, con- tinued.	Neerlandsch In- die.	20° 08'	87° 53'	P. M. light winds from N. E. cloudy and rain increasing at 10 P. M.	29.93	..	86°	10 P. M. sea rising: made all pre- parations for bad weather.
	La Meuse.	17° 01'	87° 00'	Fresh breeze from N. E. threatening. Noon in- creasing N. E. to N. N. E. P. M. variable from N. E.	....	..	..	P. M. sea increasing; 4 P. M. hove to.
	Joseph Manook.	19° 53'	89° 30'	P. M. wind N. E. b. N. N. moderate and fine. Mid- night gale from N. E.	Mid. 29.80	..	..	At 7 $\frac{1}{2}$ P. M. a heavy squall from Northward.
	Rob Roy.	19° 02'	86° 24'	N. E. to N. E. b. N. stea- dy breeze and cloudy weather; fresh gale to Noon. P. M. strong breeze E. N. E. and Easterly.	Mid. 30.15	..	..	
	Atalanta.	19° 33'	87° 38'	Noon light breeze from East and cloudy. P. M. E. N. E. 8 P. M. N. N. W.	....	..	..	By 10 P. M. threatening weather. Ship running to the S. S. W.
	H. C. P. V. Ta- voy.	Outer light sta- tion.	..	Variable winds N. N. E. to East. Heavy, leaden sky.				
	H. C. P. V. Co- leroon.	S. b. W. 3 $\frac{1}{2}$ from F. L. V. in 10 fs. water.	..	Becoming threatening and squalls at times from E. N. E. to E. S. E.				

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Simp.	Ther.	Remarks.
1850. 26th April.	Cowasjee Family.	11° 54'	87° 05'	Brisk monsoon and clear weather.	..	..	..	Heavy confused sea is still complained of, and it continues till Noon of the 27th.
	Brig Nereid.	11° 37'	88° 59'	Clear weather and fresh breeze at Noon at S. W. (5.)	29.70	..	87°	
	Æneas.	..	..	Fine weather: ship drifting to Lat. 12° 47'; Long. 88° 47' on the 27th.	..	..	..	Clearing wreck and rigging jury masts; no observation.
	John McVicar.	17° 21'	87° 46'	2 A. M. fresh gale N. E. dark cloudy weather and rain. 4 gale N. N. E. At 9 wind North. At 11 hurricane and shift to N. W.	29.00	28.90	80°	Ship running 8 and 9 knots to the S. S. W. Barometer always falling. 11 A. M. broached to, At 4.40 Bar. and Simp. began to rise, with heavy thunder and lightning.
	H. C. Str. Enterprise at AKYAB.	20° 08'	92° 55'	Variable, N. W. to North to East S. E. and S. S. E. threatening appearances and drizzling rain.				

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Simp.	Ther.	Remarks.
26th April. con- tinued.	АКѢВ.	20° 08'	92° 55'	Cloudy and Northerly wind; Noon S. West and fresh rain. 3 P. M. S. East very fresh to 8 when decreasing.	29.87			
	Atiet Rohoman.	12° 49'	85° 55'	Fine breeze West and W. b. N.	3 A. M. 29.60 Noon .70			
	H. C. Surv. Brig Krishna.	19° 19'	90° 15'	To Noon strong breeze East to E. S. E. and S. E. b. E. P. M. S. E. to South and E. S. E. at Midnight.	29.80 Mid. .78	..	85° 84°	Dark and gloomy to the South and S. S. West with a heavy South swell. Midnight, high sea.
	Ardaseer.	16° 02'	83° 53'	Fresh 7 knot breeze a N. W. b. W. decreasing with gloomy weather. 4 P. M. light airs. 8 P. M. gloomy to S. E.	Noon 29.58 4 .50 8 .37 Mid. .47	..	..	Tremendous sea, latterly heavy swell from the Eastward. 8 P. M. terri- fic swell from S. E.
	Neerlandsch In- die.	18° 4'	87° 22'	Noon wind E. N. E. 2 P. M. East blowing heavily. 5 P. M. blow- ing again from W. S. W. 7 hurricane.	4 A. M. 29.72 Noon .20 10 .50	..	86° 86° ..	Sea increasing and sky suddenly overcast. Noon sea terrific. 3 P. M. decreased suddenly to light airs East and West. 5 Renewed gale, 7 lost topmasts, &c. &c. ship in much distress. Hove to with a sail in the mizen rigging.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Simp.	Ther.	Remarks.
26th April. con- tinued.	La Meuse.	18° 24'	83° 55'	Heavy squalls N. E. P. M. North. 9 P. M. N. N. W.	....	..	..	Midnight lying to under close reef- ed main topsail, hurricane.
	Joseph Manook.	20° 30'	89° 10'	10 A. M. N. E. b. E. 5 P. M. Wind E. N. E. 8 N. E. 10 East, gale and sea increasing.	29.90	..	..	8 P. M. hove to; wind N. E.
	Roh Roy.	..	..	Breeze increasing to strong gale and heavy sea. At Noon N. E. b. E. and N. E. P. M. very strong gales. 7 P. M. North.	4. 30.10 10. 29.71 Noon. .70	..	..	Position not given. P. M. heavy rain and high sea. At 11 P. M. blowing terrifically; shifted cargo and ballast.
	Iskunder Shah.	18° 30'	85° 15'	Noon weather threatening; sunset wind E. N. E.	29.70	..	..	Bar. had been at 29.70 for the last ten days.
	Atalanta.	16° 10'	85° 47'	Daylight increasing gale and sea. 11 A. M. sud- den shift to the West- ward.	29.40 3 P. M. .50	..	..	Carried away three topmasts and mainmast; had cargo shifted, ship in great distress. P. M. hove to. On 27th moderate and fine.
	FALSE POINT.	20° 19½'	86° 59'	Noon commenced to blow from the East- ward in heavy squalls. 5 P. M. S. E. 7 South. Midnight S. W.	8 A. M. 29.80 Noon. .78 Mid. .60	..	80° 82° 80°	Moderating at 9 P. M. to a calm at Midnight.
	BALASORE.	21° 28'	87° 12'	Light breeze N. E. threatening weather and rain: 9 freshening North and East.	2 P. M. 29.70 5. .60 10. .50	..	86°	Barometer falling till 5 P. M. on the 27th. Puffy throughout the night with lulls at times.



<i>Date.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. East.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Simp.</i>	<i>Ther.</i>	<i>Remarks.</i>
26th April. con- tinued.	Near JELLA- SORE.	..	..	Fresh Easterly gales and rain throughout.				
	H. C. P. V. Ta- voy.	20° 23'	88° 27'	1 A. M. increasing gusts from N. E. daylight gale from N. E. P. M. gale at East.	29.77 to 29.47	30.05 to 29.56	..	Aneroid 29.94 to 29.65; standing to sea from the F. L. V. Wind in- creasing and oscillating from N. to N. E. in first part of the 24th.
	Beacon F. L. V. Outer Station.	..	..	4 A. M. strong N. E. breeze and cloudy, 8 Easterly increasing. Noon N. E. 8 P. M. E. N. E. Midnight heavy gale E. N. E.	29.74 to 29.60 at Noon.	..	80°	7.30 A. M. veered to 155 fs. wind and sea increasing.
	H. C. P. V. Coleroon.	Close to F. L. V.	..	Daylight strong gale from N. E. Midnight E. S. E.	4 A. M. 29.87 Noon. .83 Mid. .64	..	..	Veered to 200 fs.
	Barque Cham- pion.	Kedgerie to Saugor Flat Buoy.	..	N. E. to East blowing hard. P. M. E. N. E. hard squalls.	8 A. M. 29.80 8 P. M. .72 Mid. .69	..	..	Thick slaty appearance, strongest to Eastward; peculiar gusts of wind; at times almost calm P. M. low scud.
	Calcutta.	..	..	Heavy close weather sky overcast and calm throughout, till about 10 P. M. when the wind rose in slight squalls.	29.85	..	..	Very oppressive, a few drops of rain at intervals.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Simp.	Ther.	Remarks.
1850. 27th April.	H. C. St. Enter- prize leaving Akyab.	20° 9½'	92° 12'	Steady breeze and cloudy from E. S. E. and S. Eastward. Midnight steady breeze S. S. E.	29.90 A. 30.02*	30.00	82°	Heavy sea from S. S. E.
	АКУАВ.	20° 08'	92° 55'	Midnight S. E. and E. E. S. E. Noon fine.	29.90	..	..	
	H. C. Survey Brig Krishna.	About 25° E. S. E. of Light vessel.	..	A. M. increasing gale E S. E. 1 S. E. S. S. E. and S. b. W. at Noon. P. M. moderating.	29.69	..	84°	A. M. high sea, rain, lightning and thunder. 3 A. M. laid too.
	Ardaseer.	17° 05'	86° 00'	Breeze from S. S. E. and fine.	29.70	..	87°	
	Neerlandach In- die.	18° 02'	87° 59'	Decreasing and weather becoming fine.	29.80	..	86°	Placed in 18° 10' upon the chart to avoid confusion.
	La Mense.	18° 05'	87° 32'	W. b. N. 5 A. M. West decreasing rapidly. P. M. wind S. W.	....	..	..	
	Joseph Manook.	..	..	A. M. S. E. 2 S. S. E. 3 South heavy gale and sea. 8 P. M. moderat- ing.	29.40 P. M. 29.36	..	..	

\* The Aneroid.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Simp.	Ther.	Remarks.
27th April, con- tinued.	Roh Roy.	19° 29'	87° 06'	Wind hauling to the Westward and abating at 2 A. M. 4 A. M. W. S. W.	29.79			
	Iskunder Shah.	18° 00'	86° 10'	2 A. M. strong gusts; day- light gloomy. 7 A. M. wind N. W. Till Mid- night hurricane, when abating fast.	2 A. M. 29.60 9 .29 7 .45	..	..	Daylight hove to; lost topmasts, &c. in a heavy hurst of the hurri- cane.
	FALSE POINT.	20° 19½'	86° 59'	3 A. M. recommenced to blow from N. W.; hur- ricane to 5 A. M.	....	..	..	Country around inundated.
	BALASORE.	21° 28'	87° 12'	Increasing gale; 6 N. h. W.; blowing hard. 7 N. W. 8 W. N. W. 9 A. M. West. 9½ W. S. W. gale breaking. At 11 A. M. lulled entirely.	3 A. M. 28.90 7 .80 8 .75 8½ .69 9½ .73 10 29.01 11 .60	..	..	Blowing heavily from 3 or 4 A. M. with heavy rain; wind sweeping away trees and native houses.
	Near JELLA- SORE.	..	..	Daylight strong gale N. E. to East. 10 A. M. lull and shift. Strength of gale between 11 and 12.	....	..	..	Much rain; at 10 A. M. a lull in which the wind shifted to West- ward, and broke up at W. N. W. at 3 P. M.
	Beercool.	..	..	3 A. M. hurricane from N. E. to Noon when about East and P. M. to the Southward of East, and South.	....	..	..	On the 26th strong breeze from the N. East, increasing till it became a hurricane at 3 A. M.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Simp.	Ther.	Remarks.
27th April. con- tinued.	H. C. P. V. Ta- voy.	20° 31'	87° 52'	East to S. E.; 2 A. M. hurricane with terrific sea; 3 S. E. 7 S. S. E. 1 P. M. South; 6 S. S. W.	29.41 to 29.37 at 3 A. M. 29.68 at 10 A. M. 29.80 at 8 P. M. 2 A. M. 29.59 6 .54 Noon .68 6 P. M. .80 Mid. .86	29.50 to 29.44 29.91	80°	Aneroid 29.59 to 29.44 and again to 29.83.
	H. C. P. V. Coleroon.	Station.	..	Daylight hurricane from E. S. E. Noon veer- ing to South and abated at S. W.		..	..	Tremendous heavy sea constantly breaking over the vessel.
	HIDGELLER.	..	..	Daylight blowing with unusual force from the East. At 9 hurricane. 11½ shift to the South, less violent, and P. M. to the S. W. abating.			..	
	Barque Cham- pion.	Saugor Flat Buoy.	..	Hard squalls E. to E. S. E.; 9 heavy gale S. E. to S. S. E. Noon the same S. S. W. 3.30 P. M. more moderate. 8 P. M. monsoon breeze.	7 A. M. 29.51 9 .50 Noon .54 3.30 .60 8 .67	..	..	Daylight much scud flying. Noon clearing overhead a little. P. M. more moderate; 8 P. M. monsoon gale.
	CALCUTTA.	..	..	Midnight squally from N. E.; 2.30 blowing strong N. E.; 10½ E. S. E.; 3.25 P. M. S. S. E.; 3.50 South. 7 P. M. S. b. W.	6 A. M. 29.77 10 .78 3.25 P. M. .70 7 .72 8 .74	29.80 .81 .72 .78 .81	81 h. 82° 82½°	Remarkable intervals of almost calms between the squalls, parti- cularly before Noon. From 12 to 4 P. M. bowing harder than from 12 to 4.

<i>Date.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. East.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Simp.</i>	<i>Ther.</i>	<i>Remarks.</i>
27th April, con- tinued.	Midnapore.	..	..	3 A. M. N. E. in gusts increas- ing in violence. 6 A. M. East. At Noon veered to South and at 3 P. M. to S. W.	..	..	..	
	Bancoorah.	..	..	Daylight rain and puffs of wind from the Eastward. 8 A. M. wind N. E. Noon North, in- creasing and heavy rain. 2 N. N. W. very violent. 6 P. M. more westerly and decreasing. Midnight calm.	..	..	..	4 A. M. thunder.
	Barrackpore.	..	..	4½ A. M. blowing hard from N. E. b. E. Noon S. E. 6 S. W. b. S.	..	..	..	7 P. M. a few indistinct and dis- tant flashes of lightning. From 12 to 2 A. M. of 28th Cyclone at its height from East. 3 A. M. (28th) calm and shift to the West blowing heavily up to 6 A. M.
	Berhampore.	..	..	8 A. M. cloudy, heavy clouds and drizzling rain, light wind from East. 7 P. M. strong gusty wind East. Increasing to mid- night from East.	..	..	..	



*Barometer and Thermometer at Calcutta at the Surveyor General's Office. Bar. reduced to 32° Fahr.*

DATE.	SUN RISE.		9 H. 50' A. M.		NOON.		2 H. 40' P. M.		4 P. M.		SUNSET.	
	Bar.	Ther.	Bar.	Ther.	Bar.	Ther.	Bar.	Ther.	Bar.	Ther.	Bar.	Ther.
1850. April 26th,	29.770	78.3	29.831	83.3	29.809	87.9	29.754	87.3	29.746	84.9	29.755	81.
27th,	.674	77.8	.657	79.8	.642	80.0	.568	81.9	.535	81.8	.571	82.2
28th,	.760	78.1	.818	85.3	.800	88.0	.751	86.8	.735	87.3	.734	84.8

(To be continued.)

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ON THE RATES OF CHRONOMETERS, as influenced by the Local Attraction of Ships, and by Terrestrial Magnetism. By HENRY PIDDINGTON, President of Marine Courts, Calcutta.

In the latest and best English treatise on Navigation, that of Lieut. Raper, R. N. 3rd Edition, 1849, p. 174, after briefly referring to various opinions as to the causes of the variation of rates in Chronometers, such as motion, temperature, shocks from guns, thunder-storms, magnetism, &c. the author says that, "it seems generally admitted that the principal cause of the change of rate is variation of temperature" and he adds that "as regards the local attraction (deviation) of the ships themselves affecting the rates, no decisive experiments appear to have been made on the point." I have thus thought that where good experiments have been casually made, it becomes of much importance to Nautical, Hydrographical and Geographical science to preserve the records of them.

Before detailing the particular instances to which this paper refers it may be useful to give a brief sketch of what is known and has been done to elucidate this most important question up to the present time, so far as the limited means of Indian research enable me.

The earliest accounts we have of the effect of Magnetism on Chronometers, whether Terrestrial or Local, is I think that of Mr. Varley in the Philosophical Magazine, Vol. I. (1798) who discovered that the balances acquired polarity at two opposite points on the rim, and thus that the going of the time-piece was affected by the position of

*these poles with respect to the magnetic meridian*, Mr. Varley moreover found that every new balance which he tried was already more or less polarized!

His communication dates in 1797, but from this time to 1820 which is the date of Mr. Fisher's\* paper read by Mr. Barrow to the Royal Society (Phil. Trans. Vol. CX.) I have not found any farther published notices of this phenomenon, though skilful navigators were well aware of the tendency of Chronometers to take on "sea rates;" usually accelerated ones; and the practice was both to correct by the run to Madeira or Teneriffe if seen, and to give a "lunar rate" also. Mr. Coleman, an old Company's Officer and now an eminent teacher of Mathematics in London, has given a number of tables of rates given on shore with those found at sea with the Chronometers of various ships, mostly of those of the E. I. Company, from 1802 to 1820; distinguishing the iron from the copper-fastened vessels, but he draws no general results.

Mr. Fisher's paper, after shewing the tendency of Chronometers to take on accelerated rates, describes the remarkable effects on the rates which were found on landing them on Spitzbergen† which with one amounted to a difference of thirteen or fourteen seconds daily, and another returned to its exact London rate! Mr. Fisher also quotes Lieut. (Sir John) Franklin, as remarking that it is to this circumstance we must attribute the error of the whole of the line of Coast on the West side of East Greenland being laid down  $1\frac{1}{2}^{\circ}$  too much to the Westward by Captain Phipps (Lord Mulgrave) in 1770; and that in the first trial of Harrison's Timekeeper in 1764, the Longitude of Barbadoes was  $10' 45''$  more to the Westward than the astronomers sent out for the purpose made it. Mr. Kendal's watch made on the same construction as Harrison's, and sent out with Captain Cook (1772 to 1775) went much better than Harrison's, but its only fault was "that its rate of going was continually accelerated."

Mr. Fisher attributes the acceleration to "the magnetic action exerted by the iron of the ship on the inner rim of the balance which

\* Mr. George Fisher, Master of H. M. S. *Trent*, on the North Polar expedition under Capt. Buchan.

† The nature of the rock or soil on which the temporary hut for keeping them stood, is not adverted to. We shall presently see that this was of importance.

is made of steel," and he made several experiments upon Chronometers with magnets, to confirm his views.

In 1821, Professor Barlow, at Woolwich, made a very complete series of experiments, shewing that the vicinity of masses of *unmagnetised* iron invariably affected the rates of Chronometers placed near them; and he rightly suggests that such variation can only be supposed to arise when the balance has acquired some polarity; but it is curious to find that Professor Barlow was evidently not acquainted with Mr. Varley's paper as quoted above, which had exactly *proved* so long before what he so acutely conjectures! He even goes on to propose Mr. Varley's experiments on a detached balance, but does not make it!

Professor Barlow's paper appeared in the Philosophical Transactions for 1821, and a *resumé* of it is given in his celebrated Essay on Magnetic attractions of which the second edition, now before me, was published in 1823.\* Lt. W. Mudge in the Edin. Phil. Journal for 1821, p. 381, describing the peculiar magnetic deviations found on Mayo and the Great Salvage, as also an instance where the compasses of a Hudson's Bay Company's vessel became suddenly affected at sea in 62° N.; 93° West; relates also that one of the surveying party on the Great Salvage having laid down his watch on the rock in the morning, found when he took it up again, in the afternoon, on his return to the same spot, that it had gained two hours in the interval "an acceleration doubtless due to the action of the magnetic rock on the balance." In our Journal, Vol. XVIII. p. 410, will be found Capt. Campbell's account of a very remarkable local deviation of the compass at Saugor in Bundelcund, by which a boulder of magnetic Diorite rock was found buried in the earth when dug for at my suggestion, with my remarks.

In the Nautical Magazine for 1837, Mr. Fisher, adverting to a

\* Professor Barlow states, p. 126, "that a Master in the Navy to whom he had described his experiments told him that, when master of a first rate, he found that his Chronometer 'which was an excellent one invariably altered its rate 5' when taken on board, but that he could now account for the difference, recollecting that he had placed his Chronometer nearly in contact with an iron knee." The same perplexing fact occurred to myself with a fine box Chronometer in 1817. In the Nautical Magazine for 1845, an instance is given by Captain Wise of the *City of Derry* in which an error of 90 miles between Java Head and Cape Lagullas occurred with an excellent Chronometer near to which a pair of pistols had been placed!

communication in No. 15 of the same work (to which I cannot refer) in which it is stated by Messrs. Arnold and Dent as one of the results of their experiments that the rate of a Chronometer was sensibly affected by terrestrial magnetism when it was moved in Azimuth; details a series of experiments shewing clearly the effect of terrestrial magnetism on Chronometers; of which the rates were first ascertained when the arms of the balances were nearly in the position of the XII. and VI. on the dial plate, and then when these figures were alternately placed towards the North and South and East and West; the differences amounting to  $+ 0.42$  and  $+ 0.35$ ; when the North (XII.) was reversed to South; and to  $+ 0.28$  and  $+ 0.22$  when they were changed from West to East!

The same paper also contains a communication from Mr. Northcote, Master of H. M. S. *Jupiter*, shewing the influence of the ship's magnetism on the rates of her Chronometers in a voyage to and from the East Indies.

And finally, Professor Airy of the Royal Observatory at Greenwich (Naut. Mag. for 1840, p. 231), after describing his observations and experiments upon a Chronometer which had been sent to him from Messrs. Brookbanks & Co., "as particularly magnetic," gives rules for correcting the effect of terrestrial magnetism on a Chronometer by simply placing it on the top of the glass of a compass box. No experiments seem as yet to have been made as to obtaining any correction for the *ship's* magnetism. I do not find this subject referred to by the editor of the latest edition (1848) of Bowditch's American Navigator; and this then appears to be, from all the authorities to which I can refer in India, the present state of our knowledge as to the phenomenon itself, and the causes and means of correcting it.

My friend Captain Hopkins, of Messrs. Green's ship the *Prince of Wales*, called upon me in January to mention that he had experienced in his outward bound voyage of 1850-51, a remarkable alteration in the rates of his Chronometers; which though first rate ones and always performing well on former voyages he had found to be upwards of forty miles wrong by his lunars on his arrival at the Floating Light! This he was at a loss to account for, as it had never occurred before, the shore rates given in England having always been within a trifle correct.



I suggested that this might be owing to an increase in the ship's local attraction if she had a larger proportion of iron in her cargo on the present voyage, or her usual quantity differently placed? This he also thought probable, and stated that he *had* had more Iron on this voyage, and moreover mentioned that the same variation of rate had occurred on board of other ships which had brought out a large quantity of iron. I thought this is a question of much interest both to seamen and to hydrographical science, and I forthwith drew up a set of queries on the subject, to which Captain Hopkins of the *Prince of Wales*, Captain McLeod of the *Queen* and Capt. Lay of the *Tudor* have obliged me with replies. All these are large passenger ships; the *Tudor* brought out *less* iron on this voyage than usual and also found her Chronometers in error, but the causes of this will be seen in the reply to query No. 10. In a note to me Capt. Lay says, "I had more difference than usual, and one Chronometer became quite useless which has been my best going one for 13 years." I have printed these replies as follows, distinguishing Captain Hopkin's replies by the letter H. Captain McLeod's by M<sup>c</sup>L. and those of Capt. Lay by L., and I have preferred to give them with the queries, because they may be useful on a future occasion, or suggest other enquiries or hints as the subject is more developed; for it is evidently one of high importance and of which we have yet much knowledge to acquire, and which offers a wide field alike for the careful observer of all classes and for the ingenuity of the scientific workman in the construction of these invaluable instruments.

*Queries for ascertaining the cause of the alteration in the Rates of Chronometers on board the ship —*

GENERAL.

1. What was the whole error of your Chronometers on the voyage taking the mean of the two or three best of them and if + or — of the shore rate. State how many miles (of arc) you were East or West of the Light Vessel or other position?
 

|                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>H.—Forty miles East of the true position of the Floating Light Vessel.</p> <p>M<sup>c</sup>L.—53<math>\frac{3}{4}</math> miles East of Calcutta by mean of 3 Chronometers.</p> <p>L.—The variation from true rate was 0h. 2' 7-2". 32 miles.</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



2. Do you consider that error as due to a constant rate?

H.—I think the rates altered more after passing the Cape.

McL.—I believe it to have been a uniform rate throughout, since leaving, with the exception of one watch which was materially affected by temperature.

L.—No.

3. Did you see Madeira, or the Cape De Verds, or Tristan D'Acumha, to ascertain your measured differences of meridian by Chr. and hence the alteration up to that time?

H.—I did, but not near enough to take correct bearings.

McL.—I saw the Islands of Trinidad and Martin Vas on the 21st October, and found the means 20' to 25' East of the truth. I obtained the cross bearings of the two Islands having constructed a chart of their locality on a large scale for the purpose, and under favourable circumstances obtained my position, and thence an entire new rate for my Chrs. which rate on arrival only varied as follows: No. 1, + 20"; No. 2, + 28".6; No. 3, 6".4 being an error of 3'  $\frac{3}{4}$  of the truth. L.—No.

4. The same to Ceylon?

H.—Not seen. McL.—Not seen. L.—No.

5. Did your lunars also shew a steady alteration of rate in the Chrs. or did they shew that it began from a certain epoch as from the Cape?

H.—Yes. McL.—Lunars from 25' to 30' to the Eastward. L.—No. Variable.

6. Are your Chrs. placed this voyage as in former ones, or is there any alteration?

H.—None. McL.—Have been placed for eight years in the same place. L.—The same.

7. Any iron knees, arm stands, &c. near your Chrs. in their new berth this voyage?

H.—None. McL.—None. L.—No.

8. Had you any very severe thunder storms on the voyage? and do you think the rates may have altered from that time?

9. Can you think of any other cause which may have affected your Chronometers? and to what do you principally attribute the error?

10. Had you any alterations in the iron fittings of the ship this voyage near the Chrs.?

11. Have you had your Chrs. rated here? and how is the Calcutta with the London rate?

H.—None. M<sup>c</sup>L.—Never had fewer.—L.—No.

H.—I think, to the quantity of iron on board.

M<sup>c</sup>L.—To a large quantity of iron, never having before had so large a quantity. L.—No; I cannot say.

H.—None. M<sup>c</sup>L.—None.

L.—*Only one large iron bolt from deck to deck.*

H.—As. (*Mss. illegible.*)

M<sup>c</sup>L.—Rates as follows:

Leaving London. Found in Cal.

No. 318 — 2<sup>''</sup>.6 — 3.3

320 + 2<sup>''</sup>.0 + 0.7

333 — 2<sup>''</sup>.7 — 0.2

Altered from losing to gaining, difference one second eight tenths, per day (1<sup>''</sup>.8).

#### CARGO.

12. What quantity of bar iron and steel had you on former voyages and what on this?

H.—Little compared to this voyage. M<sup>c</sup>L.—This year 500 tons: Former years 250 to 350 tons. L.—400 to 500 tons; on this voyage 100.

13. What quantity of machinery and arms more than on other voyages?

H.—No machinery, no arms. A large number of casks of nails.

M<sup>c</sup>L.—No machinery, but 200 cases of small arms, besides iron. L.—No more.

14. Where was the bar iron stowed?

H.—Principally in the main hold. M<sup>c</sup>L.—From about 12 ft. abaft main hatchway to about 14 ft. abaft after hatchway, but the

15. Where were the tubs of steel, arms, &c. stowed?

16. Whereabouts do you consider the centre of the mass of your iron, steel, and arms to have laid? Say how many feet abaft or before the mainmast?

17. Had you any particular quantity in the afterhold?

18. And nearly under the Chronometers?

19. Have you iron tanks for water? and have you altered the stowage of them on this voyage?

20. Had you any quantity of cases of cutlery on board this voyage? and where stowed?

bulk in the main hold; 16 iron water tanks over the iron immediately under where the Chrs. stood.  
L.—Main hold.

H.—None. M<sup>c</sup>L.—Arms in the after hold. L.—None.

H.—Abreast the mainmast and a little before and abaft it. The Chrs. over it, in my cabin, abreast the main mast. M<sup>c</sup>L.—The centre of the ship; the Chrs. being abreast the mainmast on the middle deck. (*Queen* is a flush ship).  
L.—About 10 feet before the mainmast.

H.—Not a large quantity. M<sup>c</sup>L.—About 150 Tons. L.—No.

H.—A large quantity. M<sup>c</sup>L.—The greater proportion. L.—No.

H.—Iron tanks in the same place. M<sup>c</sup>L.—No. They were placed under the square of the after hatchway across the ship.  
L.—Yes. No.

H.—None. M<sup>c</sup>L.—200 cases of small arms and musquets. After part of afterhold. L.—No.

#### DEVIATION.

21. Have you ascertained the deviation of your compasses in England when ready for sea?

22. Or at sea?

H.—No. M<sup>c</sup>L.—No. L.—No.

H.—No. M<sup>c</sup>L.—No. L.—They varied from a point to half a point with each other.

23. And here in Calcutta since discharging cargo? H.—No. M<sup>c</sup>L.—No. L.—No.

24. Did you experience any remarkable currents, i. c. differences of Acet. and Chr. for 24h. and was any allowance for the deviation of your compasses made in your D. R? H.—None. M<sup>c</sup>L.—None. L.—No.

25. Did these Log-Book currents appear to prevail more when the ship was standing on any one rhumb more than on another? H.—No replies.

26. Give averages of your remarkable Log Book currents, and note how standing at those times if you can. H.—No replies.

#### FINAL.

27. Do you ever recollect instances of such remarkable alterations in the rates of your Chr<sup>s</sup>. before? H.—Never so great an error. M<sup>c</sup>L.—Yes, when on a former occasion carrying iron to a large extent.

28. Of those of other commanders? H.—No reply. M<sup>c</sup>L.—Capt. Nash of the *Maidstone* complained of the same, and having signalized with several ships, I found them all to the Eastward of my reckoning after having made my corrections. All more or less carrying iron this year.

29. Do you recollect any instances of the kind in print? H.—None. M<sup>c</sup>L.—None.

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The replies to the foregoing queries seem to be exactly a confirmation of my supposition that Captain Hopkin's and McLeod's Chronometers were affected by the large quantity of iron on the *Prince of*

*Wales and Queen*; and the *Tudor* has fortunately given us an instance which, though without careful enquiry it would at first seem to contradict the other two cases, is both explained by that enquiry and offers a good confirmation of the whole theory: the single massive bolt near the Chronometers being probably a vertical magnet, or as a mere mass of iron producing as much mischief as the whole mass of cargo iron at a distance from them in the body of the other ships. But to set the question before the readers of the Journal in all its bearings, we have some farther considerations to take into account; for "Chronometers are seldom or never found to have the same rate at the end of a voyage that they had at its commencement" says a high authority:\* And this indeed is known to every one who has used them.

I was informed in the course of some enquiries on this subject by Mr. Black, of the firm of Black and Murray, Watch and Chronometer makers of this city, that there is a very general complaint, and indeed that it is almost constantly found, that the London or Liverpool rates given with ships' Chronometers prove incorrect ones on the voyage out; but that the Calcutta rates found on their being landed here are usually about those determined by the lunars on the voyage, and the whole run from England to the Sand Heads; (Mr. Black is speaking especially of the Chronometers of the first rate passenger ships and traders to the port, most of which come into his hands for rating, and are watches of the best description;) and he adds that it is usually found that the Calcutta rate is a perfectly correct one back to England, and even that on the next voyage though a London or Liverpool rate is given with the Chronometer this is usually found incorrect, and many Commanders take up the old Calcutta rate of the last voyage and carry it on, and find it the correct one!

This would appear singularly to complicate the problem. Let us see how many conditions are to be taken into account to solve it; assuming of course that the rate is as carefully determined in London and Liverpool as it is in Calcutta these are——

1. Carrying the Chronometer from the watchmaker's on board the ship?

\* Capt. Bayfield, R. N. "On Rating Chronometers," Nautical Magazine, 1843, p. 320.



2. Effect of the ship's local attraction, from her iron-work and guns upon a polarized balance, in a man of war?

3. Effect of the cargo and iron work in a merchantman?

4. Vicinity to or bearing of, or direction of ship's head in regard of the magnetic poles, augmenting the effect of terrestrial magnetism in any ratio more than a direct one as the latitude is increased?

5. Distance from the magnetic equator?

6. Opposite effects of terrestrial magnetism in Northern and Southern hemispheres; so much (three-fourths) of the voyage to India being performed in the Southern hemisphere.

7. Difference of cargo out and home. (Accounts for rates being more permanent homeward.)

8. Whether there be not a local magnetic effect in London, Liverpool and in all great cities and towns? arising from the enormous masses of common and polarized iron in them?\* a minute one of course, but sufficient to cause a variation of rate? We have comparatively very little iron at Calcutta?

Let us consider these conditions separately:—

1. *Carrying the Chronometers on board.* Except where the Chronometer is regulated near the docks, no doubt many chances of deranged rates may arise from this source; for between the jolting of a conveyance and the obstructions from passengers if on foot, the conveyance of a box Chronometer is always a delicate and a difficult undertaking in the streets of London or Liverpool.

2—3. *The effect of the ship's local attraction and of her cargo* we have already considered, and the facts now brought forward seem to place it most unequivocally and beyond any doubt as one of the leading causes of the irregularity.

4—5. *Magnetic poles and Magnetic Equator.* Assuming that terrestrial magnetism affects the balances of Chronometers, of which

\* All iron which remains long in a vertical position as a rail or the bar of a window, becomes magnetic. There are millions of bars of iron so placed in London, to say nothing of as much more in other positions; the railings are, it is true, of cast iron, which affects the compass least; but their prodigious number and with those which have stood from a quarter of a century to a whole century or more, their increased magnetism; which must go on to saturation, one would suppose? may place them as high as wrought iron or blistered steel.

there can also be no doubt; it is highly worthy of notice that on any usual voyage from England, South of the Equator, and consequently on a Brazilian, East India, China, or Cape voyage, the ship crosses near to the spot (about Bahia, say in  $13\frac{1}{2}$  South Lat. and  $35^{\circ}$  West Long.) where the Magnetic Equator crosses the line of No Variation; or in plainer words where there is no dip or variation; whereas in England the variation may be called in round numbers  $24^{\circ}$  and the dip  $70^{\circ}$ .

The Chronometer is rated in England under these strong influences, and every day's sail from England rapidly diminishes them to the Magnetic Node above alluded to. They then increase again (but in an opposite hemisphere) and for a short time, from Trinidad to a few degrees East of the Cape where the line of dip of  $60^{\circ}$  intersects that of  $30^{\circ}$  Westerly variation, they become high, but they rapidly decrease again until the ship reaches the Bay of Bengal, where she again crosses the Magnetic Equator and is not far from the line of No Variation, having but a very feeble one of  $2^{\circ}$  or  $3^{\circ}$ .

At Calcutta the Chronometer is rated under  $2^{\circ}$  or  $3^{\circ}$  of variation only and  $20^{\circ}$  of dip, or about the mean of that last influence for the whole voyage; if it has *any* influence? and in a city comparatively free from iron as compared with those of Europe; and it is carried but a few hundred yards to place it in the boat which conveys it on board a ship, of which no part of the homeward bound cargo is magnetic. All these circumstances are no doubt in favour of the Calcutta rates; but whether it be the accidental causes, such as cargo, &c. or the permanent ones such as the terrestrial magnetism which give this advantage to the Indian rates it is difficult and at present indeed impossible to pronounce. It will probably be found that both influence the result. The fact, in which every confidence may be placed, is one of the highest importance to the right understanding of this anomaly.

In regard to the permanent causes, we have again to consider, in reference to Messrs. Arnold and Dent's experiments alluded to at page 63, and the results stated by Mr. Northcote, how the arms of the balance may have been placed with reference to the magnetic meridian while rating, and how they would be placed on board the ship. The first of these conditions probably varies at every maker's, according as the house, or shop, or room used for rating, is placed; but on board ship the XII-VI. is usually, in the present day, and in large ships, placed

in a line with the keel; in Mr. Northeote's experiments however it was placed at right angles to it, and *against the side*, (which side, is not said) and this again throws much uncertainty upon the results, for the bolts, which would be hidden by the lining of the Chronometer-room or cabin, might have affected the balances. We may suppose the balance to be so hung that, when at rest, the arms coincide with the XII. and VI. hour marks. The line of the keel from the Channel to the Magnetic Node in  $13\frac{1}{2}^{\circ}$  S. will generally be not far from a line at right angles with the lines of variation, thus allowing this influence to have its full effect whatever that may be; and after passing this point it will be at first, and until Trinidad is reached, nearly *upon* the lines of variation, and then again gradually approach to a right angle with them, not being perhaps at less than  $45^{\circ}$  till Amsterdam and St. Paul's are passed; after which it will be gradually approaching the magnetic meridian with a very low variation, until the ship's arrival at Calcutta.

On the homeward bound voyage from India however the case is different. The ship leaves Calcutta with Chronometers rated under very favourable circumstances as regards terrestrial magnetism, and without cargo to affect the rate, which is thus only disturbed by her local Deviation,\* and until near the tropic of Capricorn experiences but little terrestrial variation, too weak indeed, as we may suppose, to affect the balance, as it does not exceed  $5^{\circ}$  to  $10^{\circ}$ ; though it is gradually becoming stronger, and at right angles to the line of her keel, or the line of XII. VI. Upon her crossing the southern tropic, say in  $65^{\circ}$  East, we may call the variation  $15^{\circ}$  at right angles to the keel, and the dip  $55^{\circ}$ ; and from hence to past the Cape the variation is constantly rising to  $30^{\circ}$  and nearly at right angles, but the Cape once passed the whole distance to the latitude of  $30^{\circ}$  North and to the West of the Azores, is nearly upon the magnetic meridians! but at this point, with a high variation, the keel (XII. VI. line) is again thrown gradually round as she passes the Azores and until the ship's arrival in England is nearly at right angles to the magnetic meridian.† In the Appendix to Vol. II. of the Survey-

\* My friend Capt. Henning, of Messrs. Green's ship, the *Alfred*, has obliged me with a note of his local variation (deviation) as observed in the Hooghly, and it amounts only to about  $5^{\circ}$  on a mean.

† And the Cape and Channel are the two points at which we so frequently hear of accidents from the Chronometers being wrong. I mean of course blundering

ing Voyage of H. M. S. *Adventure* and *Beagle*, p. 345, Captain Fitzroy says—speaking of his chain of Chronometric measurements round the globe (the italics are mine) that—

“It ought to be clearly stated, however, that the sum of all the parts which form the chain amounts to more than twenty-four hours, therefore error must exist somewhere; but what has principally caused the error, or where it may be said to exist, I am unable to determine. The whole chain exceeds twenty-four hours, in about thirty-three seconds of time.”

“It appears very singular, that the more the various links of this chain are examined and compared with other authorities, the more reason there seems to be for believing them correct, at least to within a very small fraction of time; and even allowing that each link were one or two seconds of time wrong, it does not appear probable that all the errors would lie in one direction, *unless some hitherto undetected cause* affects Chronometers when carried Westward, which might affect them differently when carried Eastward.”

“It would ill become me to speak of any value which may be attached to these Chronometrical measures; even erroneous as they undoubtedly are in some part, if not to a certain degree almost every where. I can only lay the honestly obtained results before persons who are interested in such matters, and request that they may be compared with those of the best authorities.”

\* \* \* \* \*

“The only idea I can dwell on, with respect to the cause of this error of thirty-three seconds, is, *that Chronometers may be affected by magnetic action in consequence of a ship's head being for a considerable time towards the East or West*: yet this is but a conjecture. In the measures between Bahia and Rio de Janeiro, and in those between Rio de Janeiro and Cape Horn, there is no evidence of any permanent cause of error; but the greater part of those measurements were made with the ship's head usually near the meridian.”

As to the Chronometers of H. M. S. generally, and those of the *Adventure* and *Beagle* in this instance, we know that they are rated at the Observatory at Greenwich, where every precaution is of course taken, and where they are free from the influence of any of the London masses of iron. It farther appears that the rate of the *Beagle's* Chronometers

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or fine weather strandings; not those through sheer stress of weather. And I do not forget that they are the only two landfalls, excepting St. Helena and Ascension, on the voyage. As an opposite extreme we may take the Western entrance to Bass' Straits which is crossed by the line of no variation, so that here the Terrestrial Magnetism (apart from the dip) has no influence. But the error of the watches was accumulating from off the Cape.



was materially altered by the ship's local attraction, for which of course due allowance was made in the measurements. Captain Fitzroy after describing the precautions taken to place them near the centre of the ship, and mentioning that the local attraction must always have remained the same, says—p. 320.

“After the Chronometers had been carefully rated at the Observatory, they were embarked on board H. M. S. *Adventure*, on the 23rd April, 1826; but as the ship was detained at Deptford and Northfleet until the 4th May, an opportunity was offered of ascertaining what change had been produced by the alteration of the place; and it turned out to be no means inconsiderable. Five of the watches had accelerated, and the remaining four had retarded rates. It would be difficult to assign any other reason for this change than the effect of the ship's local attraction.”

So far Captain Fitzroy, but from the sketch chart of the *Beagle's* voyage prefixed to the volume now quoted, it would appear that leaving England, she first crossed the Magnetic Node on her passage to Bahia and Rio Janeiro. She then increased her variation to  $20^{\circ}$  or  $25^{\circ}$  East (which from England was a difference of nearly  $50^{\circ}$  in the whole though acting in opposite directions) when surveying Terra Del Fuego, and afterwards when approaching Lima reduced it to  $5^{\circ}$  East; crossing the Magnetic Equator again.

From the coast of South America to the Galapagos, and thence to the Society Islands she had not above  $5^{\circ}$  of variation, and would cross the Magnetic Equator a third time, increasing thence her variation to  $15^{\circ}$  at New Zealand; the line of it being not far from that of the keel, and then rapidly decreasing it, nearly to Zero, at Hobart Town; and from that port to the Cocos, she would sail in what we may call the great zone of little variation\* and then again, like the homeward bound East Indiamen, increase her variation to the Cape, having it, for a time, at right angles with her keel. She then approaches very closely to the magnetic Node in the Atlantic as she proceeds to Rio, and from that port sails back, mostly at about right angles to the magnetic meridian, to the Cape de Verds; then upon it to the Azores,

\* At the Magnetic Equator in the Eastern Hemisphere there is a zone of at least  $100^{\circ}$  of Longitude in which the variation only ranges from  $5^{\circ}$  West to  $5^{\circ}$  East.



where her course again lies more or less athwart it to England, like the homeward bound vessels of which we have already spoken.

If we allow any influence at all to terrestrial magnetism, the error of thirty-three seconds which Captain Fitzroy describes does not at all seem excessive or surprising; nor again, that while amongst our own, or with our own and foreign navigators, many admirable coincidences in Chronometric measurements are to be found, some hitherto unaccountable discrepancies, from which some discussion and ink-shed have arisen, should also exist.

It is clear, I think, that, wholly apart from the ship's local attraction, and all the precautions which science can devise, the agreement or discordance of any two sets of Chronometric measurements, even by the same Chronometers and observers, may depend upon the ship's track; upon the position of the XII. VI. line (or other polar line) of the balances of the Chronometers in relation to the keel; and all this again upon the *degree* of polarization of the balances! Here are surely the elements of a great and delicate scientific investigation yet to be made?\*

It would seem then to result from the foregoing facts and views, though writing in Calcutta I have been unable to consult a host of authorities to which I should have been desirous of referring, such as Gauss, Sabine, Duperrey, Blosseville, &c. that temperature is by no means "the principal cause of the variation of the rates of Chronometers" and indeed we have of late years had some extensive experiments made to prove that Chronometers may undergo great variations of temperature without any considerable change of rate, though to these also

\* It should be made by a double Chronometric voyage; one ship proceeding East and another West. Both should rate their Chronometers, specially and independently of all other rating, as near as may be to the Magnetic Nodes (say at Bahia and Manila which are about 12h. apart), and while measuring their chain of distances should particularly endeavour to ascertain, at various spots, the effect of the placing of the XII.—VI. or polarized line of the balances coinciding with, or athwart, and at various angles to the Magnetic meridian. Perhaps part of the Spitzbergen variations recorded by Mr. Fisher, (page 62) may have been due also to this cause, and if the Chronometers had been placed in the Magnetic meridian they would have given different results. He evidently overlooks the terrestrial magnetism and attributes the change of rate to the absence of the ship's local attraction only.

I cannot now refer ; and it seems not improbable that as a change of terrestrial magnetism *also* took place when the changes of temperature occurred with those ships' Chronometers which have supposed their rates affected by temperature, the effects of the one, as more sensible and better known, or in other words nearer at hand, have been compeudiously attributed to the other. The causes seem to stand rather in the following order as to the importance of their effects, the whole of them being constant ones.

I. The ship's local attraction. Sometimes that of the cargo in merchantmen, or of warlike stores in a man-of-war : Alters rates also by *privation*, as when cargo or warlike stores are discharged, or Chronometers carried on shore.\*

II. Terrestrial magnetism, and the angle made by the poles of the polarized balance with the magnetic meridian.

III. Changes of temperature.

It is evident also that all these may be under some circumstances trifling, or that one may neutralise the two others if they should act in opposite directions ; but it is also evident that they may be each comparatively trifling in itself, yet, if the whole act the same way, they may amount on a long voyage to a considerable error, against which it behoves the careful navigator to be on his guard. The scientific workman will consider, better than I can do, if it may not be worth his while to produce on trial a Chronometer from the balance of which magnetic metals should be wholly excluded. Glass balances have, I know been tried, but found too fragile. Tough porcelain would seem to promise better.

\* " The changes so frequently noticed to take place in the rates of Chronometers moved from the shore to the ship *and the reverse*, are well known to be caused partly by change of temperature and partly by change of situation," says Captain Fitzroy, p. 326 of appendix ; and in a note : " This may be connected with magnetism." The work is published in 1839, and Mr. Fisher's second paper appeared in 1837, but Captain Fitzroy may not have seen it, since he refers only so cursorily to a fact of such high importance shewn by direct experiment.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL

FOR JANUARY, 1851.

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The Annual General Meeting of the Asiatic Society was held on the 8th instant, at the usual hour and place.

The Honorable SIR J. W. COLVILE, President, in the Chair.

The proceedings of the last Meeting were read and confirmed.

The Hon'ble J. C. Erskine, duly proposed and seconded at the December Meeting, was elected an ordinary member.

Read Letters,

- |                                    |                                                            |
|------------------------------------|------------------------------------------------------------|
| 1st. From A. Wattenbach, Esq. . .  | } Signifying their wish to with-<br>draw from the Society. |
| 2nd. From J. B. Mill, Esq. . . . . |                                                            |
| 3rd. From James Dodd, Esq. . . .   |                                                            |

4th. From W. Seton Karr, Esq., forwarding a copy of the Rig Veda Sañhitá, presented to the Society, by the Honorable Court of Directors.

5th. From Major W. Anderson, offering to give such parts of the Rauza-tul-Safá, and Habib-ul-Saer, as the Society does not possess, in exchange for such as it may have in duplicate. Referred to the Secretary.

6th. From Dr. A. Sprenger, suggesting that the Ketáb-ul-Máárraf, a work by Ibn Qutaybáh, about 600 years old, of which he possesses two good MSS., be printed in the Bibliotheca Indica.

It was resolved—proposed by Mr. Mitchell and seconded by Dr. Roer, that Dr. Sprenger's proposal to print the Ketab-ul-Máárraf in the Bibliotheca Indica, at the expense of the Oriental Fund, be adopted, and Dr. S. be requested to undertake the editing of the work, and to supply a translation.

7th. From B. H. Hodgson, Esq., submitting an additional notice of the Shou or the Tibetan Stag. Ordered to be printed in the Journal.

8th. From Dr. E. Roer, Secretary, Oriental Section, forwarding a translation, by Dr. Ballantyne, of the Sárhitya Darpana, for publication in the Bibliotheca Indica.

Ordered that the recommendation of the Oriental Section be adopted.

9th. From the same, submitting sundry suggestions from the Oriental Section, for the publication of the Purāṇas.

Ordered that the papers be brought forward for consideration at the next Meeting.

10th. From the same, in reply to a reference from the Society regarding a translation of the 'Vichitra Nátak,' by Capt. Siddons.

Ordered that Capt. Siddons' translation be printed in the Journal.

11th. From Dr. A. Campbell, Darjeling, forwarding specimens of a fish from Nepal. Dr. C. continues, "The Lakes of Thibet swarm with this fish, which is caught in immense quantities with the hand during the winter when the Lakes are frozen over; holes are broken in the ice, to which the fish crowd for air, and they are handed out in great numbers. They are gutted and split up at once; the extreme dryness of the air effects the curing, as you see them, in a few days. Salt is not used to preserve them.

"The principal Lakes for this fish are 'Dochen,' 'Ramchoo,' and 'Yamdo Yeuntro,' (for these 'see Turner's Thibet,' and my Routes to Lassa in the Journal of the Society, for 1848.) Dried, as you see them, they are sent in large quantities to all the principal marts, viz., Lassa, Menchoua, Yiangtchi and Digarchi."

A note was read from Dr. Cantor, in which he states that "Dr. McClelland concurs with me in thinking that the fish is a carp, and belongs either to the genus *Schizothorax*, Heckel, (Fish aus Caschmir, p. 11,) or to *Racoma*, McClelland, (Calcutta Journal of Natural History, Vol. II. page 576.) The state of the specimens will not admit of an examination sufficient to identify the species. To take a drawing of the fish is consequently also impracticable."

Mr. Blyth was of opinion that it is a Barbel of the European type, and nearly affined to *Barbus plebeius*, Valenciennes, but remarkable for wanting the barbules on the upper lip from which the genus takes

its name, and that it could be seen that the absence of these barbules was not the result of accident.

He moreover was decidedly of opinion that the species was undescribed in Dr. Heckel's work.

12th. From C. Beke, Esq., presenting a copy of an Enquiry, by him, into M. Antoine Abbaddies' Journey into Kaffa.

Mr. Mitchell remarked that the resolution moved by Mr. Welby Jackson and seconded by the President, was not appended along with the other extracts from the proceedings of the General Meeting, held on the 6th November, 1850, to the proposed Draft Code, and put various questions touching the omission of that resolution. The President replied; and there appearing grounds to suppose, that the Mofussil members were not sufficiently informed as to the manner in which they were to vote upon the proposed rules, Mr. Mitchell proposed and the President seconded, that the following letter should be forwarded to all the Mofussil Subscribers for their votes, and that the Special General Meeting to consider the draft Code of Bye-Laws be postponed from the 15th of January to the 12th of March, 1851.

SIR,—I beg to inform you that the meeting for the consideration of the proposed Code of Bye-Laws, has been postponed until Wednesday, the 12th of March. This postponement has been made in consequence of an accidental omission to supply you with the requisite information, as to the mode in which the votes of the Mofussil Members on the Proposed Code of Bye-Laws are to be taken.

That information is supplied by the subjoined resolution.

*Resolved, that Mofussil Members be requested to vote YES or NO to each rule. Further, that should a Mofussil member make any suggestion of amendment, the Secretary will bring it to the notice of the Meeting, and in the event of any member present supporting the suggestion, it can be disposed of as any other motion; if not so supported, the suggestion will not be considered by the Meeting.*

You are therefore requested to send to me in writing, on or before the 12th of March, your votes upon the Bye-Laws according to the above resolution, (that is) either stating that you vote for the adoption or rejection of the proposed Code as a whole; or writing Yes or No to each rule, and adding by way of proposal any amendment which you may wish to have moved upon any particular rule.

I remain, Sir,

Your Obedient Servant,

Secretary Asiatic Society.



13th. The Council submitted the following report on the affairs of the Society.

*Annual Report.*

The Council of the Asiatic Society submit with much satisfaction their Annual Report, shewing the state of the Society's affairs during the past year.

At the close of the year 1849, the number of Members was 144, since which period ten (10) new Members have been elected and admitted, and fourteen (14) have returned from Europe, making a total of 24 Members added to the Society during the past year. On the other hand, the Society have to regret the death of four (4) Members, and the loss of (15) fifteen by withdrawal, and that of seven (7) others by departure to Europe. Thus at the close of 1850, the number of Members, actually in India, and subscribing, amounts to 142.

The Council cannot quit this subject without regretting that, whilst in the year 1847-48, there was a steady increase in the list of members, and that the number of elections amounted to 48 and 32, respectively, in the year 1850, there have been only (10) ten elections, and amongst them the name of no native gentleman appears. The Council feel assured that the support of the learned and of the scientific will not be withheld from an institution which for a period of (67) sixty-seven years has steadily carried out the designs of its illustrious founder, and has greatly advanced the cause of science and Oriental literature, and deservedly enjoys the high reputation which all Europe has thankfully and cheerfully accorded.

*Finances.*

The Council submit the following report from the Finance Committee, which they believe to present a correct and not unsatisfactory statement of the financial position and prospects of the Society.

*Asiatic Society's Rooms, January 3, 1851.*

The Members of the Finance Committee, having carefully examined the annual accounts of the Asiatic Society for the year 1850, are happy that they are able to submit an encouraging report on its Financial position.

From a minute investigation into the Government grants, the income of the Asiatic Society from all sources, and of its expenditure, the Committee are happy to find that the annual surplus, taking into con-

sideration the present number of subscribers in India and the existing rate of subscriptions, may fairly be estimated to amount to (3,000) three thousand Rupees. The pressing debts of the Society amount to Rs. 4,880, but of Rupees 1,615, which is considered to be in suspense and not hopeless, at least Rs. 1,200 may be considered sooner or later available to meet the liabilities of the Society, which would thus be reduced to Rupees 3,680; leaving, however, a surplus of present assets (over the chances of any such ultimate recoveries of sums in the least doubtful, entirely out of consideration and) over every description of debt, which may safely be reckoned to amount to three thousand rupees.\*

The Society has, moreover, paid off during the past year the sum of Rupees 4,447-8-3 as the annexed detail shows.

(Signed) J. R. COLVIN.

S. G. T. HEATLY.

\* INCOME.

(From the Society's own resources).

|                              |     |        |   |   |
|------------------------------|-----|--------|---|---|
| Contribution,.....           | Rs. | 8,253  | 3 | 9 |
| Library, .....               |     | 41     | 0 | 0 |
| Sale of Oriental Works,..... |     | 1,044  | 6 | 3 |
| Journal, .....               |     | 1,295  | 8 | 0 |
| Miscellaneous,.....          |     | 100    | 0 | 0 |
| Total, .....                 |     | 10,734 | 2 | 0 |

EXPENSE.

(Not provided by the Government Grants).

|                              |     |        |    |   |
|------------------------------|-----|--------|----|---|
| Zoological Department, ..... | Rs. | 864    | 0  | 0 |
| Library, .....               |     | 1,764  | 4  | 6 |
| Sale of Oriental Works,..... |     | 32     | 13 | 6 |
| Journal, .....               |     | 3,000  | 0  | 0 |
| Secretary's Office, .....    |     | 636    | 15 | 9 |
| Building, .....              |     | 100    | 0  | 0 |
| Miscellaneous,.....          |     | 1,337  | 1  | 2 |
| Total, .....                 |     | 7,735  | 3  | 0 |
| Income, .....                | Rs. | 10,734 | 2  | 0 |
| Expense, .....               |     | 7,735  | 3  | 0 |
| Surplus Rs.                  |     | 2,998  | 15 | 0 |

*Rules of the Society.*

The Council of the Asiatic Society, in their last Annual Report, drew the attention of the Society to the necessity of revising the existing rules; the Society having resolved that such a revision should be made, a revised code of Rules has been submitted to the Society, and will be taken into consideration on the 15th instant.

*Secretaries.*

About the commencement of the past year, the Society was deprived of the valuable services of Mr. Laidlay, who was compelled by ill-health to re-visit Europe. Mr. Laidlay's ability, zeal and worth are too well known to require any lengthened eulogium at the hands of the Council. In consequence of a resolution of the Society Mr. Laidlay, though absent, continues to be one of the Joint-Secretaries of the Society.

About the same time, the exigencies of the public service rendered it imperative on Dr. O'Shaughnessy to resign the appointment of Secretary, which he had so long, so ably, and so zealously filled. The Council, with the sanction of a general meeting of the Society, conveyed to that gentleman the expression of their deep regret at his resignation of the office of Secretary, and unanimously resolved to place on record their grateful sense of his valuable services. At a meeting of the Society held on the 1st May, 1850, Captain Hayes was elected Secretary in the room of Dr. O'Shaughnessy.

*Journal.*

The number of Journals which have been published with the past year amount to 9, including three for October, November and December, 1849, which comprise the valuable and interesting catalogue of Malayan Fishes by that eminent naturalist, Dr. Cantor. This number in materials, in fact, equals (6) six ordinary ones, and will supply certain important desiderata in the Ichthyology of the Eastern Seas long felt and anxiously expected.

*Bibliotheca Indica.*

During the past year (8) eight numbers have been issued. A sub-committee consisting of J. R. Colvin, Esq. W. Jackson, Esq. Captain Broome, Babu Ram Gopal Ghose, and Captain Hayes, have been appointed to report upon the publication and suggest whatever they might deem advisable with reference to it. Owing

to circumstances, the Sub-Committee has not been yet able to submit a report.

#### *Museum.*

Curators have been very regular in their attendance to their studies. The arrangement of the skeletons in the Museum of Natural History reflects much credit on Mr. Blyth. In July last, the Society called upon Mr. Piddington to submit a report on the Museum of Economic Geology, which has accordingly been submitted by the Curator.

#### *Library.*

About 130 volumes have been added to the Library in the year 1850 ; during which period the Society has expended the sum of Rupees eighty-nine, thirteen annas and six pie (Rs. 89-13-6) in the purchase of books.

The state of the Library demands the anxious attention of the Council, in order that the numerous works in science and literature which are much required may be procured, and the value of the Library with reference to standard works enhanced, and as there appears some prospect of a permanent surplus, the Council beg to recommend, that the improvement of the Library should be considered the primary object to which such surplus, if any, should be devoted.

#### *Librarian.*

The Librarian has been very attentive and unremitting in the discharge of his duties, and the Council would desire to mark their sense of that official's conduct and application.

The interest which is evinced in the Museum and in the Society at large is manifest by the vast number of Europeans, Americans and Natives who visit the institution.

By order of the Council,

*January the 8th, 1851.*

Signed F. HAYES, *Secretary.*

After the conclusion of the proceedings, the President retired, and Mr. S. G. T. Heatly, Member of the Council present, took the chair, and the meeting then proceeded to the election of Office-Bearers and Members of the Council and of the several Sections.

On scrutiny of the lists it being found that three gentlemen for the Council had received the same number of votes each, the Chairman gave his casting vote in favor of Mr. Grote, and the following gentlemen were declared elected.

*President.*—Sir James Colville, Kt.

*Vice-Presidents.*

|                  |                           |
|------------------|---------------------------|
| The Lord Bishop. | J. W. Laidlay, Esq.       |
| W. Jackson, Esq. | W. B. O'Shaughnessy, Esq. |

*Council.*

|                     |                       |
|---------------------|-----------------------|
| J. R. Colvin, Esq.  | Ramgopal Ghose, Esq.  |
| C. Beadon, Esq.     | R. W. G. Frith, Esq.  |
| W. Seton Karr, Esq. | Capt. A. Broome,      |
| A. Grote, Esq.      | S. G. T. Heatly, Esq. |
| J. Newmarch, Esq.   |                       |

*Secretary.*—Capt. F. C. C. Hayes.

ORIENTAL SECTION.

|                     |                          |
|---------------------|--------------------------|
| W. Jackson, Esq.    | W. Seton Karr, Esq.      |
| Bábu Harimohan Sen. | Bábu Rajendralál Mittra. |
| Rev. W. Kay.        | Rev. J. Long.            |
| Dr. E. Roer.        |                          |

SECTION OF NATURAL HISTORY.

|                      |                |
|----------------------|----------------|
| A. Mitchell, Esq.    | A. Grote, Esq. |
| R. W. G. Frith, Esq. |                |

STATISTICAL SECTION.

|                   |                    |
|-------------------|--------------------|
| Dr. D. Stewart.   | Rev. J. Long.      |
| A. Mitchell, Esq. | W. Macintosh, Esq. |
| C. Beadon, Esq.   |                    |

SECTION OF GEOLOGY AND MINERALOGY.

|                   |               |
|-------------------|---------------|
| A. Mitchell, Esq. | Capt. Broome. |
|-------------------|---------------|

PHYSICS AND METEOROLOGY.

|                   |                        |
|-------------------|------------------------|
| Capt. Thuillier.  | Venerable J. H. Pratt. |
| J. Newmarch, Esq. | Col. Forbes.           |

FINANCE COMMITTEE.

|                       |                 |
|-----------------------|-----------------|
| J. R. Colvin, Esq.    | C. Beadon, Esq. |
| S. G. T. Heatly, Esq. |                 |



Dr.

*Abstract Statement of Receipts and*

## RECEIPTS.

## To MUSEUM.

|                                                                                                                                                                                                       |                 |   |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---|---|
| Received from the General Treasury the amount of allowance authorized by the Court of Directors for the service of a Curator from December 1849 to November, 1850, at 250 Rs. per mensem, . . . . Rs. | 3,000           | 0 | 0 |
| Ditto ditto for the preparation of Specimens of Natural History from ditto to ditto, at 50 Rs. ditto, . . . .                                                                                         | 600             | 0 | 0 |
| Ditto back amount of Mr. Swarris's salaries, his services not having been entertained, as per cash book,                                                                                              | 30              | 0 | 0 |
|                                                                                                                                                                                                       | <hr/> 3,630 0 0 |   |   |

## To MUSEUM OF ECONOMIC GEOLOGY.

|                                                                                                                                                                                |                 |   |   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---|---|
| Received from ditto the amount of allowance authorized by Government for the service of a joint Curator from December 1849 to November, 1850, at 250 Rs. per mensem, . . . . . | 3,000           | 0 | 0 |
| Ditto ditto for Establishment and contingencies, at 64 Rs. per mensem, . . . . .                                                                                               | 768             | 0 | 0 |
| Ditto amount of fines from Carpenter's pay, . . . . .                                                                                                                          | 1               | 5 | 3 |
|                                                                                                                                                                                | <hr/> 3,769 5 3 |   |   |

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 Carried over, . . . . . 3,739 5 3

## Disbursements of the Asiatic Society, for the year 1850.

Cr.

## DISBURSEMENTS.

## BY MUSEUM.

|                                                                                                                           |       |       |      |
|---------------------------------------------------------------------------------------------------------------------------|-------|-------|------|
| Paid Mr. E. Blyth's salary as Curator from December 1849 to November, 1850, being 12 months, at 250 Rs. per mensem, ..... | 3,000 | 0     | 0    |
| Ditto ditto house-rent from ditto to ditto, being 12 months, at 40 Rs. per mensem, .....                                  | 480   | 0     | 0    |
| Ditto Establishment of Taxidermists, Artists, &c., from December 1849 to August, 1850, at 82 Rs. per ditto, ..            | 738   | 0     | 0    |
| Ditto ditto from September to November, 1850, at 62 Rs. per ditto, .....                                                  | 186   | 0     | 0    |
|                                                                                                                           | <hr/> | 924   | 0 0  |
| Ditto for Contingencies incurred for the preparation of Specimens of Natural History, .....                               | 332   | 15    | 0    |
| Ditto Racket Carpenter for Sundry Works, .....                                                                            | 21    | 13    | 6    |
| Ditto for one gross of Teak Wood small forms including paper at 8 as. per dozen, .....                                    | 6     | 0     | 0    |
| Ditto for 8 dozen glass stoppered bottles, .....                                                                          | 28    | 2     | 6    |
|                                                                                                                           | <hr/> | 4,792 | 15 0 |

## BY MUSEUM OF ECONOMIC GEOLOGY.

|                                                                                                                                   |       |       |     |
|-----------------------------------------------------------------------------------------------------------------------------------|-------|-------|-----|
| Ditto Mr. H. Piddington's salary Joint-Curator from December 1849 to November, 1850, being 12 months at 250 Rs. per mensem, ..... | 3,000 | 0     | 0   |
| Ditto Establishment from December 1849 to November, 1850, .....                                                                   | 420   | 0     | 0   |
| Ditto for Contingencies, .....                                                                                                    | 89    | 11    | 3   |
| Ditto for 4 lbs. liquor ammonia, .....                                                                                            | 17    | 0     | 0   |
| Ditto for 8 vols. Berzelius' <i>Traité de Chimie</i> , .....                                                                      | 56    | 0     | 0   |
| Ditto for a copy of Bengal Directory for the year 1849, .....                                                                     | 8     | 0     | 0   |
| Ditto for a copy of Becquerel's <i>Elements de Physique Terrestre</i> , .....                                                     | 10    | 0     | 0   |
| Ditto for a copy of Dana's <i>Mineralogy</i> , .....                                                                              | 5     | 0     | 0   |
| Ditto for a copy of Austen's <i>Elementary Course of Geology</i> , .....                                                          | 9     | 0     | 0   |
| Ditto for a copy of Tailor's <i>Statistics of Coal</i> , .....                                                                    | 18    | 12    | 0   |
| Ditto for Sundry Books, .....                                                                                                     | 31    | 0     | 0   |
| Ditto for 7 Maps, .....                                                                                                           | 12    | 0     | 0   |
| Ditto for 5 Test Glasses, .....                                                                                                   | 5     | 0     | 0   |
| Ditto for 2 dozen of Glasses, Cups, .....                                                                                         | 6     | 0     | 0   |
| Ditto for $\frac{1}{2}$ lb. Carbonate Ammonia, .....                                                                              | 2     | 0     | 0   |
|                                                                                                                                   | <hr/> | 3,689 | 7 3 |

## BY MUSEUM OF MINERALOGY AND GEOLOGY.

|                                                                 |       |    |      |
|-----------------------------------------------------------------|-------|----|------|
| Paid Mr. H. Piddington, Curator for Sundry Contingencies, ..... | 28    | 13 | 3    |
|                                                                 | <hr/> | 28 | 13 3 |
| Carried over, .....                                             | 8511  | 3  | 6    |

|                                                |                       |      |   |   |
|------------------------------------------------|-----------------------|------|---|---|
|                                                | Brought forward,..... | 7399 | 5 | 3 |
| TO LIBRARY.                                    |                       |      |   |   |
| Received by sale of Miscellaneous Books, ..... | 41                    | 0    | 0 |   |
|                                                | <hr/>                 |      |   |   |
|                                                |                       | 41   | 0 | 0 |

## TO SALE OF ORIENTAL PUBLICATIONS.

|                                                                                                        |       |       |   |   |
|--------------------------------------------------------------------------------------------------------|-------|-------|---|---|
| Received by sale of Oriental Works sold at the Library and subscriptions to the "Bibliotheca Indica,". | 1,044 | 6     | 3 |   |
|                                                                                                        | <hr/> |       |   |   |
|                                                                                                        |       | 1,044 | 6 | 3 |

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Carried over,..... 8484 11 6

Brought forward,..... 8,511 3 6

## BY LIBRARY.

|                                                                                                                                                                         |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Paid Babu Rajendra lal Mittra's salary as Assistant Secretary and Librarian from December 1849 to November, 1850, being 12 months, at 70 Rs. per mensem,.....           | 840 0 0 |
| Ditto Establishment from December 1849 to November, 1850, being ditto, at 37-8 per mensem, .....                                                                        | 450 0 0 |
| Ditto Contingencies from December 1849 to October, 1850, .....                                                                                                          | 42 5 3  |
| Ditto Messrs. W. Thacker and Co. for purchase of Books, .....                                                                                                           | 61 12 0 |
| Ditto Messrs. L. C. Lepage and Co. for purchase of books and landing charges, .....                                                                                     | 15 12 0 |
| Ditto Duftery for binding books, .....                                                                                                                                  | 310 8 0 |
| Ditto Messrs. Stewart, Ford and Co. account current Messrs. Smith Elder and Co. for parts 2nd, 3rd, of Richardson's Ichthyology for H. M. Ship Sulphur, at,.....10 s. £ | 1 0 0   |
| Carriage overland to Calcutta, .....                                                                                                                                    | 0 3 0   |
| £                                                                                                                                                                       | 1 3 0   |

|                                                                |                 |
|----------------------------------------------------------------|-----------------|
| Exch. at 1 s. 10½ d. per rupee is Co.'s Rs.....                | 12 5 3          |
| Paid Mr. C. Martin, for Sundry Stationery, .....               | 14 2 0          |
| Ditto E. C. Plum, Comr. Brig. "Erin" freight for 2 Cases,..... | 6 0 0           |
| Ditto charges for landing parcels, .....                       | 11 8 0          |
|                                                                | <hr/> 1,764 4 6 |

## BY SALE OF ORIENTAL PUBLICATIONS.

|                                                                                                                                                              |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Paid Mr. M. G. Castello, Govt. Steam Department, freight for two parcels despatched to Capt. M. Kittoe, Benares, .....                                       | 3 0 0         |
| Ditto ditto freight ditto to ditto,.....                                                                                                                     | 5 7 6         |
|                                                                                                                                                              | <hr/> 8 7 6   |
| Ditto Hurrishunder Bose and Sons, freight on a case of books despatched to Messrs. W. H. Allen and Co. London,.....                                          | 16 0 0        |
| Ditto charges for shipping ditto on Board the Ship,.....                                                                                                     | 1 4 0         |
|                                                                                                                                                              | <hr/> 17 4 0  |
| Ditto Messrs. Smith and Cowel, freight on a case of books despatched to Rev. J. Wilson and Dadahboy Punduring, Esq. at Bombay, .....                         | 5 0 0         |
|                                                                                                                                                              | <hr/> 5 0 0   |
| Ditto Mr. M. G. Castello, Govt. Steam Department, freight for Sundry Oriental Works, despatched to Rev. W. Smith, Benares, on account current J. Muir, ..... | 1 8 0         |
| Packing charges, .....                                                                                                                                       | 0 10 0        |
|                                                                                                                                                              | <hr/> 2 2 0   |
|                                                                                                                                                              | <hr/> 2 2 0   |
|                                                                                                                                                              | <hr/> 32 13 6 |

Carried over,..... 10,308 5 6

N

Brought forward,..... 8,484 11 6

**To JOURNAL.**

Received by sale of the Society's Journal and Sub-  
scriptions to ditto, ..... 1,295 8 0  
1,295 8 0

**To SECRETARY'S OFFICE.**

Received from Buckawoolla Peon, in full of Rs. 10  
advanced him on account of his salary, ..... 7 0 0  
7 0 0

**To CONTRIBUTIONS AND ADMISSION FEES.**

Received from Members amount of  
quarterly Contributions from Jan. to  
Dec. 1850,..... 7,710 1 11  
Ditto in advance, ..... 63 1 10  
Ditto ditto by transfer,..... 208 0 0  
7,981 3 9  
Ditto ditto Admission Fees,..... 272 0 0  
8,253 3 9

**To MISCELLANEOUS.**

Received from R. H. Buckland amount proceeds of old  
Furniture sold at their Auction on account of the  
Society,..... 35 12 3  
35 12 3

Carried over,..... 18,076 3 6



Brought forward,..... 10,308 5 6

## BY JOURNAL.

|                                                                                                                                            |       |    |   |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------|----|---|
| Paid Rev. J. Thomas, on account current Baptist Mission Press, for printing the Society's Journal from October 1848 to August, 1849, ..... | 3,388 | 0  | 0 |
| Ditto Mr. Thomas Black, Proprietor of the Asiatic Lithographic Press, for Lithographing plates, &c....                                     | 441   | 15 | 9 |
| Ditto Ramgopaul Roy, Engraver for making and engraving six copper plates of Indian Coins, .....                                            | 96    | 0  | 0 |
| Ditto Mudoosoodun Doss, Draftsman, his salary from March to October last, .....                                                            | 99    | 2  | 3 |
| Ditto Horeemohun Doss, for coloring 100 copies plates of Fishes, .....                                                                     | 4     | 0  | 0 |
| Ditto Mr. G. H. Stapleton, for lithographing 400 copies of 2 Diagrams, .....                                                               | 4     | 0  | 0 |
| Ditto colouring 409 copies of plates of Fishes, .....                                                                                      | 16    | 5  | 9 |
| Ditto Abdul Halim Draftsman for drawing on transfer paper, a chart of the Jumna's Cyclones, .....                                          | 10    | 0  | 0 |
| Ditto ditto for copy of a map of Spiti Valley, .....                                                                                       | 22    | 0  | 0 |
|                                                                                                                                            | 32    | 0  | 0 |
| Ditto freight for Journals despatched to Messrs. W. H. Allen and Co. London, .....                                                         | 78    | 6  | 0 |
| Ditto contingencies and postages, .....                                                                                                    | 40    | 2  | 3 |
|                                                                                                                                            | 4,200 | 0  | 0 |

## BY SECRETARY'S OFFICE.

|                                                                                      |     |    |   |
|--------------------------------------------------------------------------------------|-----|----|---|
| Paid Establishment from December 1849 to November, 1850, at 42 Rs. per mensem, ..... | 501 | 7  | 6 |
| Ditto Extra Duftery for ruling papers, from December 1849 to 8th May, 1850, .....    | 5   | 4  | 3 |
| Ditto Stationery, .....                                                              | 27  | 14 | 0 |
| Ditto extra writer, .....                                                            | 4   | 10 | 9 |
| Ditto engraving and making a seal, .....                                             | 3   | 0  | 0 |
| Ditto Messrs. W. Thacker and Co. for Stationery, ..                                  | 8   | 0  | 0 |
| Ditto Messrs. D'Rozario and Co. for ditto, .....                                     | 3   | 8  | 0 |
| Ditto for a Writing Table, .....                                                     | 13  | 12 | 0 |
| Ditto for Account Books, .....                                                       | 3   | 7  | 0 |
| Ditto for Contingencies and Postages, .....                                          | 66  | 0  | 3 |
|                                                                                      | 636 | 15 | 9 |

## BY MISCELLANEOUS.

|                                                                                                                                                       |     |    |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|---|
| Paid Mr. Halligan's salary, as night guard from December 1849 to November, 1850, being 12 months, at 40 Rs. per mensem, .....                         | 480 | 0  | 0 |
| Ditto for Advertizing Meeting of the Society in the Newspapers, .....                                                                                 | 96  | 5  | 6 |
| Ditto Mr. J. Chaunce, for winding up and keeping the clock in order from May 1849 to April, 1850, ..                                                  | 25  | 0  | 0 |
| Ditto Rev. J. Thomas, account current Baptist Mission Press, for printing Miscellaneous Papers, &c.                                                   | 450 | 12 | 0 |
| Ditto Bábu Dukenarunjun Mookerjee, Collector of Assessment for the premises of the Asiatic Society, Park Street, No. 45, from May to September, 1850, | 105 | 0  | 0 |

Carried over,..... 15,145 5 3

Brought forward,..... 18,076 3 6

**TO BALANCE.**

|                                                       |          |           |
|-------------------------------------------------------|----------|-----------|
| As per account closed on the 31st of December, 1849,  | 614 14 7 |           |
| Amount in the Bank of Bengal account of Journal       |          |           |
| Asiatic Society as per separate account closed on the |          |           |
| 31st December, 1849, .....                            | 108 12 4 |           |
|                                                       | <hr/>    | 723 10 11 |

Carried over,..... 

---

 18,799 14 5

|                                                                                                                           |                       |        |   |   |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------|--------|---|---|
|                                                                                                                           | Brought forward,..... | 15,145 | 5 | 3 |
| Ditto for Sundry Contingent charges for the Meeting,<br>and oil for night guard, .....                                    | 81                    | 9      | 6 |   |
| Ditto Essurchunder Doss, for packing boxes,.....                                                                          | 11                    | 10     | 3 |   |
| Ditto for an Iron Chest, .....                                                                                            | 46                    | 4      | 0 |   |
| Ditto for making stand, &c. for ditto,..                                                                                  | 8                     | 0      | 0 |   |
|                                                                                                                           | <hr/>                 | 54     | 4 | 0 |
| Ditto Sibchunder Doss, extra writer for copying re-<br>vised rules of the Society, .....                                  | 4                     | 0      | 0 |   |
| Ditto Babu Rajendra Lall Mittra Librarian, Postage for<br>despatching draft code of rules to Mofussil Mem-<br>bers, ..... | 20                    | 8      | 0 |   |
| Ditto for Sundries, .....                                                                                                 | 3                     | 0      | 0 |   |
| Ditto for lithographing 256 copies of bills, at 2 Rs.<br>per 100,.....                                                    | 5                     | 0      | 0 |   |
|                                                                                                                           | <hr/>                 | 1,337  | 1 | 3 |

## By BUILDING.

|                                                                                                                   |       |     |   |   |
|-------------------------------------------------------------------------------------------------------------------|-------|-----|---|---|
| Paid J. M. Vos, Esq. in full of his account for repair-<br>ing the premises of the Asiatic Society as per bill,.. | 380   | 10  | 3 |   |
| Ditto Mr. R. Crow, builder for masonry work done<br>to the premises of ditto, .....                               | 81    | 6   | 6 |   |
|                                                                                                                   | <hr/> | 462 | 0 | 9 |

## By H. TORRENS, Esq.

|                                                                                                           |       |    |   |   |
|-----------------------------------------------------------------------------------------------------------|-------|----|---|---|
| Paid him by transfer in part payment of Rs. 934, due<br>to him by the Society on the 31st December, 1849, | 64    | 0  | 0 |   |
|                                                                                                           | <hr/> | 64 | 0 | 0 |

## By J. MUIR.

|                                                                                                           |       |    |   |   |
|-----------------------------------------------------------------------------------------------------------|-------|----|---|---|
| Paid him by transfer in part payment of Rs. 268, due<br>to him by the Society on the 31st December, 1849, | 64    | 0  | 0 |   |
|                                                                                                           | <hr/> | 64 | 0 | 0 |

## By J. W. LAIDLAY.

|                                                                                                                       |       |       |        |     |
|-----------------------------------------------------------------------------------------------------------------------|-------|-------|--------|-----|
| Paid him by transfer in part payment of Rs. 459-7-4,<br>due to him by the Society on the 31st December,<br>1849,..... | 16    | 0     | 0      |     |
|                                                                                                                       | <hr/> | 16    | 0      | 0   |
|                                                                                                                       |       | <hr/> | 17,088 | 7 3 |

## By BALANCE.

|                                        |       |       |   |            |
|----------------------------------------|-------|-------|---|------------|
| In the Bank of Bengal, .....           | 1,279 | 9     | 8 |            |
| Ditto on account of the Journal, ..... | 108   | 12    | 4 |            |
| Cash in hand, .....                    | 19    | 2     | 8 |            |
| A draft on the Accountant General, ..  | 160   | 0     | 0 |            |
|                                        | <hr/> | 1,567 | 8 | 8          |
| Carried over,                          | 1,567 | 8     | 8 | 17,088 7 3 |

Brought forward,..... 18,799 14 5

Company's Rupees. .... 18,799 14 5

Brought forward, 1,567 8 8 17,088 7 3

## BY INEFFICIENT BALANCE.

|                                                                                                                                                   |         |                        |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------|-------------|
| For balance of the amount advanced to<br>Mr. Templeton, for Contingences in<br>the Museum and Zoology Department,<br>for May and June, 1849, .... | 7 1 0   |                        |             |
| For balance of the amount advanced to<br>Mr. E. Blyth, for ditto ditto for No-<br>vember last, .....                                              | 50 1 0  |                        |             |
| Ditto ditto for December,..                                                                                                                       | 50 0 0  |                        |             |
|                                                                                                                                                   | <hr/>   | 100 1 0                |             |
| Ditto Babu Rajendra Lall Mittra Li-<br>brarian, for ditto for October and<br>November,.....                                                       | 20 12 6 |                        |             |
| Ditto for December, .....                                                                                                                         | 16 0 0  |                        |             |
|                                                                                                                                                   | <hr/>   | 36 12 6                |             |
|                                                                                                                                                   | <hr/>   | 143 14 6               |             |
|                                                                                                                                                   |         | <hr/>                  | 1,711 7 2   |
|                                                                                                                                                   |         |                        | <hr/>       |
|                                                                                                                                                   |         | Company's Rupees. .... | 18,799 14 5 |
|                                                                                                                                                   |         |                        | <hr/>       |

Errors and Omissions Excepted,  
COLLYCHURN NUNDY.



Dr.

*The Oriental Publication Fund in*

|                                                             |       |    |          |
|-------------------------------------------------------------|-------|----|----------|
| <b>January 11th, 1850.—To Cash paid Dr. E. Roer,</b>        |       |    |          |
| Editor of the Oriental Journal—Bibliotheca Indica,          |       |    |          |
| his Salary for December last,.....                          | 100   | 0  | 0        |
| Ditto ditto, Establishment for ditto,.....                  | 70    | 0  | 0        |
| Ditto ditto, Contingencies for ditto,.....                  | 4     | 13 | 6        |
| Ditto 16th ditto, Establishment for the Custody of          |       |    |          |
| Oriental works for December, 1849, .....                    | 42    | 0  | 0        |
|                                                             | <hr/> |    |          |
|                                                             |       |    | 216 13 6 |
| <b>February 4th, ditto, Dr. E. Roer, Editor of the Ori-</b> |       |    |          |
| ental Journal—Bibliotheca Indica, his Salary for            |       |    |          |
| January, .....                                              | 100   | 0  | 0        |
| Ditto ditto, Establishment for ditto, .....                 | 70    | 0  | 0        |
| Ditto ditto, Contingencies for ditto, .....                 | 5     | 8  | 0        |
| Ditto 16th ditto, Establishment for the Custody of          |       |    |          |
| Oriental Works for January,.....                            | 42    | 0  | 0        |
| Ditto 6th ditto, Sariett Ullah Duftery for binding          |       |    |          |
| Sundry Oriental Works as per bill, .....                    | 13    | 12 | 0        |
| Ditto 13th ditto, Babu Rajendralal Mittra for Sun-          |       |    |          |
| dry Contingencies for December, 1849,.....                  | 2     | 4  | 0        |
| Ditto 20th ditto, for January, .....                        | 1     | 5  | 0        |
|                                                             | <hr/> |    |          |
|                                                             |       |    | 234 13 0 |
| <b>March 4th ditto, Dr. E. Roer, Editor of the Ori-</b>     |       |    |          |
| ental Journal—Bibliotheca Indica, his Salary for            |       |    |          |
| February, .....                                             | 100   | 0  | 0        |
| Ditto ditto, Establishment for ditto, .....                 | 70    | 0  | 0        |
| Ditto ditto, Contingent for ditto, .....                    | 4     | 12 | 0        |
| Ditto 12th, ditto, Babu Rajendralal Mittra for Sun-         |       |    |          |
| dry Contingencies for February last, .....                  | 0     | 12 | 0        |
| Ditto 21st ditto, Establishment for the Custody of          |       |    |          |
| Oriental Works for February, .....                          | 42    | 0  | 0        |
|                                                             | <hr/> |    |          |
|                                                             |       |    | 217 8 0  |
| <b>April 1st, 1850.—To Cash paid Rev. J. Thomas, on</b>     |       |    |          |
| account of Baptist Mission Press, for printing Bib.         |       |    |          |
| Indica for October and November, 1849.                      |       |    |          |
| Nos. 22 and 23,.....                                        | 546   | 0  | 0        |
| Ditto 6th ditto, Sariett Ullah Duftery for binding          |       |    |          |
| books as per bill, .....                                    | 11    | 6  | 0        |
| Ditto 1st ditto, Dr. E. Roer, Editor Oriental Jour-         |       |    |          |
| nal—Biblio. Indica, his Salary for March, .....             | 100   | 0  | 0        |
| Ditto ditto, Establishment for ditto, .....                 | 70    | 0  | 0        |
| Ditto ditto, Contingencies for ditto,.....                  | 4     | 6  | 0        |
| Ditto 23d ditto, Babu Hurrakissen Dhur, manager             |       |    |          |
| Asiatic Library for a copy of Lexicon Bibliogra-            |       |    |          |
| phicum, Vol. I. ....                                        | 10    | 0  | 0        |
| Ditto 24th ditto, Establishment for the Custody of          |       |    |          |
| Oriental Works for March, .....                             | 42    | 0  | 0        |
| Ditto ditto, Babu Rajendralal Mittra for Sundry             |       |    |          |
| Contingencies for March, .....                              | 1     | 1  | 0        |
| Ditto ditto, Mannul for a MS. copy of Dara Sekh's           |       |    |          |
| Persian translation of the Upanishads,.....                 | 12    | 0  | 0        |
|                                                             | <hr/> |    |          |
|                                                             |       |    | 796 13 0 |
|                                                             | <hr/> |    |          |
| Carried over,.....                                          | 1,465 | 15 | 6        |

*Account Current with the Asiatic Society.*

Cr.

|                                                                                                                                                                                  |        |       |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-----|
| January 1st, 1850.—By Balance of account closed and published down to the 31st December, 1849.                                                                                   |        |       |     |
| Company's Papers of the new 5 per Cent. Loan deposited with the                                                                                                                  |        |       |     |
| Govt. Agent,.....                                                                                                                                                                | 4,000  | 0     | 0   |
| Cash in the Bank of Bengal, .....                                                                                                                                                | 580    | 8     | 3   |
| Cash in hand, .....                                                                                                                                                              | 14     | 14    | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  | 4,595  | 6     | 3   |
|                                                                                                                                                                                  |        | <hr/> |     |
|                                                                                                                                                                                  |        | 4,595 | 6 3 |
| Ditto 22d ditto.—By Cash received from the General Treasury, being the monthly grant sanctioned by the Court of Directors for the month of December, 1849, .....                 |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| February 23rd, ditto ditto for January, 1850,.....                                                                                                                               |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| March 21st, ditto ditto for February, 1850, .....                                                                                                                                |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| April 21st, 1850.—By Cash received from the General Treasury, being the amount of monthly grant sanctioned by the Hon'ble Court of Directors for the month of March, 1850, ..... |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| May 21st, ditto ditto for April, 1850,.....                                                                                                                                      |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| June 21st, ditto ditto for May, 1850, .....                                                                                                                                      |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| July 16th, ditto ditto for June, 1850, .....                                                                                                                                     |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| August 19th, 1850.—By Cash received from the General Treasury, being the Amount of monthly grant sanctioned by the Court of Directors for the month of July, 1850,.....          |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| Ditto ditto.—Amount invested in the new 5 per Cent. Government Loan as per sub-Treasurer's receipt countersigned by the Government Agent, .....                                  |        |       |     |
|                                                                                                                                                                                  | 1,500  | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 1,500 | 0 0 |
| September 21st, ditto Amount received from the General Treasury, being the monthly grant sanctioned by the Court of Directors for the month of August, 1850, .....               |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| October 5th, ditto ditto for September, 1850,.....                                                                                                                               |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| November 19th, ditto ditto for October, 1850, ....                                                                                                                               |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
| December 21st, 1850.—By Cash received from the General Treasury, being the monthly grant sanctioned by the Court of Directors for the month of November, 1850, .....             |        |       |     |
|                                                                                                                                                                                  | 500    | 0     | 0   |
|                                                                                                                                                                                  | <hr/>  |       |     |
|                                                                                                                                                                                  |        | 500   | 0 0 |
|                                                                                                                                                                                  |        | <hr/> |     |
| Carried over,.....                                                                                                                                                               | 12,095 | 6     | 3   |

|                                                                                                                                                                 |                       |       |    |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------|----|------------|
|                                                                                                                                                                 | Brought forward,..... | 1,465 | 15 | 6          |
| May 18th ditto, Dr. E. Roer, Editor of the Oriental Journal—Bibliotheca Indica, his Salary for April last,.....                                                 | 100                   | 0     | 0  |            |
| Ditto ditto, Establishment for ditto, .....                                                                                                                     | 70                    | 0     | 0  |            |
| Ditto ditto, Contingencies for ditto,.....                                                                                                                      | 5                     | 13    | 6  |            |
| Ditto ditto, Establishment for the Custody of Oriental Works for April, .....                                                                                   | 42                    | 0     | 0  |            |
| Ditto ditto, Babu Rajendralal Mittra for Sundry Contingencies for April last,.....                                                                              | 1                     | 6     | 0  |            |
|                                                                                                                                                                 |                       |       |    | 219 3 6    |
| June 25th ditto, Sariat Ullah Duftery for binding books, as per bill, .....                                                                                     | 22                    | 0     | 0  |            |
| Ditto ditto, Establishment for the Custody of Oriental Works for May last,.....                                                                                 | 42                    | 0     | 0  |            |
|                                                                                                                                                                 |                       |       |    | 64 0 0     |
| July 22nd ditto, Establishment for the Custody of Oriental Works for June last, .....                                                                           | 42                    | 0     | 0  |            |
| Ditto 25th ditto, Babu Rajendralal Mittra for Sundry Contingencies for May and June last, .....                                                                 | 2                     | 9     | 0  |            |
|                                                                                                                                                                 |                       |       |    | 44 9 0     |
| August 14th, 1850.—To Cash paid Establishment for the Custody of Oriental Works for July last, ....                                                             | 42                    | 0     | 0  |            |
| Ditto 19th ditto, J. S. Patton, Government Agent as contribution for a new 5 per Cent. Government Loan, .....                                                   | 1,500                 | 0     | 0  |            |
| Ditto 24th ditto, Dr. E. Roer, Editor of the Oriental Journal—Bibliotheca Indica, his Salary for May, June and July last, .....                                 | 300                   | 0     | 0  |            |
| Ditto ditto, Establishment for ditto, .....                                                                                                                     | 210                   | 0     | 0  |            |
| Ditto ditto, Contingencies for ditto, .....                                                                                                                     | 20                    | 10    | 6  |            |
| Ditto 28th ditto, Madanmohan Sarmana for Sundry Oriental Works, viz.                                                                                            |                       |       |    |            |
| 5 Copies Kádambari, Vol. 2.                                                                                                                                     |                       |       |    |            |
| 1 ditto Dasha Kumára.                                                                                                                                           |                       |       |    |            |
| 1 ditto Sánkhya Tattva Kaumudí.                                                                                                                                 |                       |       |    |            |
| 1 ditto Byákarana Bhusansár, as per bill.                                                                                                                       | 14                    | 0     | 0  |            |
|                                                                                                                                                                 |                       |       |    | 2,086 10 6 |
| September 16th ditto, Establishment for the Custody of Oriental Works for August last, .....                                                                    | 42                    | 0     | 0  |            |
| Ditto ditto, Babu Rajendralal Mittra for Sundry Contingencies, July last, .....                                                                                 | 3                     | 12    | 0  |            |
| Ditto 21st ditto, Dr. E. Roer, Editor of the Oriental Journal—Bibliotheca Indica, his Salary for August last,.....                                              | 100                   | 0     | 0  |            |
| Ditto ditto, Establishment for ditto, .....                                                                                                                     | 45                    | 0     | 0  |            |
| Ditto ditto, Contingencies for ditto, .....                                                                                                                     | 28                    | 6     | 0  |            |
|                                                                                                                                                                 |                       |       |    | 219 2 0    |
| October 29th ditto, Establishment for the Custody of Oriental Works for September last,.....                                                                    | 42                    | 0     | 0  |            |
| Ditto 30th ditto, Rev. J. Thomas, for printing the Bibliotheca Indica for December, 1849, and from January to April, 1850, or Nos. 24 to 28, as per bill, ..... | 1,252                 | 10    | 0  |            |
|                                                                                                                                                                 |                       |       |    | 1,294 10 0 |
| Carried over,.....                                                                                                                                              | 5,394                 | 2     | 6  |            |

Brought forward,..... 12,095 6 3

Carried over,..... 12,095 6 3  
O 2

|                                                                                                                                  |                        |        |   |            |
|----------------------------------------------------------------------------------------------------------------------------------|------------------------|--------|---|------------|
|                                                                                                                                  | Brought forward, ..... | 5,394  | 2 | 6          |
| November 16th ditto, Establishment for the Custody of Oriental Works for October last.....                                       | 42                     | 0      | 0 |            |
| Ditto ditto, Dr. E. Roer, Editor of the Oriental Journal—Bibliotheca Indica, his Salary for September and October last,.....     | 200                    | 0      | 0 |            |
| Ditto ditto Establishment for the months of September and October, .....                                                         | 78                     | 0      | 0 |            |
| Ditto ditto, Contingencies for ditto, .....                                                                                      | 56                     | 11     | 0 |            |
| Ditto 21st ditto, Babu Rajendralal Mittra for Sundry Contingencies for September last,.....                                      | 2                      | 5      | 6 |            |
| Ditto 25th ditto, Sariat Ullah Duftery for binding sundry books, as per bill, .....                                              | 22                     | 8      | 0 |            |
| Ditto 29th ditto ditto, for binding sundry books, as per bill, .....                                                             | 6                      | 12     | 0 |            |
|                                                                                                                                  |                        |        |   | 408 4 6    |
| December 18th, 1850.—To Cash paid Dr. E. Roer, Editor of Oriental Journal—Bibliotheca Indica, his Salary for November last,..... | 100                    | 0      | 0 |            |
| Ditto ditto, Establishment for ditto, .....                                                                                      | 35                     | 0      | 0 |            |
| Ditto ditto, Contingencies for ditto, .....                                                                                      | 29                     | 5      | 0 |            |
| Ditto ditto, Establishment for the Custody of Oriental Works for ditto, .....                                                    | 42                     | 0      | 0 |            |
|                                                                                                                                  |                        |        |   | 206 5 0    |
| Dec. 31st, 1850.—To balance                                                                                                      |                        |        |   |            |
| Company's Paper of the new 5 per Cent. Loan deposited with the Government Agent, .....                                           | 5,500                  | 0      | 0 |            |
| Cash in the Bank of Bengal,.....                                                                                                 | 554                    | 2      | 9 |            |
| Cash in hand, .....                                                                                                              | 32                     | 7      | 6 |            |
|                                                                                                                                  |                        |        |   | 6,086 10 3 |
|                                                                                                                                  | Company's Rupees,....  | 12,095 | 6 | 3          |

*Calcutta, Asiatic Society, }*  
*the 31st Dec., 1850. }*

Brought forward, . . . . . 12,095 6 3

Company's Rupees, . . . . . 12,095 6 3

Errors and Omissions Excepted.  
CALLYCHURN NUNDY.





Dr. *Abstract Statement of Oriental Publications, Journal, &c. &c. sold from the 1st January to the 31st December, 1850.*

Cr.

## ORIENTAL PUBLICATIONS.

|                                                                                                                                                                 |       |   |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---|---|
| Fatāwe Alamgiri Vol. I. 7 copies, Vol. II. 4 copies,<br>Vol. III. 4 copies, Vol. IV. 7 copies, Vol. V. 7<br>copies, Vol. VI. 7 copies, @ Rs. 8, per copy... Rs. | 288   | 0 | 0 |
| Mahābhārata, Vol. I. 10 copies, Vol. II. 10 copies,<br>Vol. III. 10 copies, Vol. IV. 10 copies,.....                                                            | 290   | 0 | 0 |
| Index to ditto, 11 copies,.....                                                                                                                                 | 21    | 0 | 0 |
| Susruta, 5 copies,.....                                                                                                                                         | 18    | 0 | 0 |
| Harivansa, 7 copies,.....                                                                                                                                       | 19    | 8 | 0 |
| Raja Tarangini, 1 copy,.....                                                                                                                                    | 3     | 0 | 0 |
| Neishada, 6 copies,.....                                                                                                                                        | 16    | 8 | 0 |
| Kbāzmat-ul Ilm, 14 copies,.....                                                                                                                                 | 42    | 0 | 0 |
| Anis ul Mosharrāhin, 6 copies,.....                                                                                                                             | 12    | 0 | 0 |
| Sharaya-ul Islam, 20 copies,.....                                                                                                                               | 80    | 0 | 0 |
| Hæberlin's Anthology, 6 copies,.....                                                                                                                            | 36    | 0 | 0 |
| Hodgson's Aborigines, 1 copy,.....                                                                                                                              | 3     | 0 | 0 |
| Tibetan Grammar, 4 copies,.....                                                                                                                                 | 20    | 0 | 0 |
| Ditto Dictionary, 3 copies,.....                                                                                                                                | 18    | 0 | 0 |
| Bibliotheca Indica, 273 Nos.,.....                                                                                                                              | 273   | 0 | 0 |
|                                                                                                                                                                 | 1,140 | 0 | 0 |

## JOURNAL.

|                                                       |    |   |   |
|-------------------------------------------------------|----|---|---|
| Journal of the Asiatic Society, 42 Nos.,.....         | 67 | 0 | 0 |
| Asiatic Researches, Vol. XVIII. part I., 4 copies, .. | 20 | 0 | 0 |
| History and Literature of the Vedas, 1 copy, .....    | 0  | 8 | 0 |
| Roer's Vedānta Sāra, 2 copies, .....                  | 1  | 0 | 0 |
|                                                       | 88 | 8 | 0 |

## LIBRARY.

|                                                      |     |   |   |
|------------------------------------------------------|-----|---|---|
| Mālavika Agnimitra, 1 copy,.....                     | 1   | 8 | 0 |
| Kosegarten's Pañchatantra, 1 copy, .....             | 6   | 0 | 0 |
| Stenzler's Mrichbhakati, 1 copy, .....               | 6   | 0 | 0 |
| Meng Tsue, 1 copy,.....                              | 9   | 0 | 0 |
| Hodgson on Buddhism, 1 copy,.....                    | 3   | 0 | 0 |
| Burnouf's Commentaire sur le yacna,.....             | 10  | 0 | 0 |
| Bohtlingk's Sacuntalā, 4 copies,.....                | 24  | 0 | 0 |
| Gildmeister's Bibliotheca Sanskrita, 2 copies, ..... | 4   | 0 | 0 |
| Westergaard's Radices Sanskrita, 1 copy,.....        | 6   | 0 | 0 |
| Wilson's Meghaduta, 1 copy,.....                     | 2   | 0 | 0 |
| Gladwin's Dissertations, 1 copy,.....                | 1   | 8 | 0 |
| Taylor's Lelabati, 1 copy, .....                     | 3   | 0 | 0 |
| Journal Asiatique,.....                              | 1   | 0 | 0 |
| Bryant's Mythology,.....                             | 15  | 0 | 0 |
| Sanskrita Catalogue, 1 copy, .....                   | 1   | 0 | 0 |
| Persian Catalogue, 2 copies,.....                    | 2   | 0 | 0 |
| Lassen's Sanskrita Anthology, 1 copy, .....          | 4   | 0 | 0 |
| Bohtlingk's Pāṇini, 2 copies, .....                  | 16  | 0 | 0 |
|                                                      | 115 | 0 | 0 |

|                                              |       |    |   |
|----------------------------------------------|-------|----|---|
| Total Co.'s Rs.,.....                        | 1343  | 8  | 0 |
| Outstanding bills as per Acct. of 1849,..... | 982   | 6  | 5 |
| Total Co.'s Rs.,.....                        | 2,325 | 14 | 5 |

|                                                                                                                            |       |    |   |
|----------------------------------------------------------------------------------------------------------------------------|-------|----|---|
| By Cash paid to Sib Chunder Nundy Acct. and Cally<br>Chara Nundy Offg. Acct. from the 1st Jan. to 31st<br>Dec. 1850, ..... | 1,031 | 6  | 5 |
| By Amount carried to the debit of Sir J. Colville,....                                                                     | 10    | 0  | 0 |
| Ditto ditto J. W. Laidlay, Esq.,.....                                                                                      | 25    | 0  | 0 |
| Ditto ditto J. Muir, Esq.,.....                                                                                            | 30    | 0  | 0 |
| By a copy of Journal, No. 31, N. S. returned by<br>Messrs. Thacker and Co., .....                                          | 1     | 8  | 0 |
| By outstanding bills, .....                                                                                                | 1,097 | 14 | 5 |
|                                                                                                                            | 1,228 | 0  | 0 |

Total Co.'s Rs.,..... 2,325 14 5

Errors and Omissions excepted,  
RAJENDRALAL MITTRA.



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OF THE  
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| Prinsep, C. R. Esq.              | Thurburn, R. V. Esq.              |
| Prasannakumára Tagore, Bábu.     | Walker, H. Esq.                   |
| Pratt, The Venerable Arch-deacon | Willis, J. Esq.                   |
| J. H.                            | Wilson, The Right Rev. Daniel,    |
| Packenham, Capt. G. D.           | Lord Bishop of Calcutta.          |
| Pratáb Chandra Sing, Rájá.       | Waugh, Lieut.-Col. A. S.          |
| Ramánátha Tagore, Bábu.          | Watkins, C. T. Esq.               |
| Rámagopála Ghosa, Bábu.          | Young, Dr. R.                     |

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LIST OF MEMBERS ELECTED DURING THE YEAR 1850.

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 Reddic, J. Esq.  
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## LOSS OF MEMBERS DURING THE YEAR 1850.

*By departure to Europe.*

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Johnstone, John, Esq.  
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Laidlay, J. W. Esq.  
Low, Col. H.  
Strachey, Lieut. R.

*By death.*

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*By withdrawal.*

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Hannay, Major F. S.  
Udny, G. Esq.  
Low, Col. J. H.  
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Slater, Rev. S.  
Stubbs, Lieut. F. W.



*Report of Curator, Zoological Department, for the months of October,  
November and December, 1849.*

SIR,—I have the honour to report the following acquisitions in the Zoological Department of the Society's Museum; the first six referring to specimens which I personally make over to the Society.

1. Received from C. T. Eyton, Esq. Skins of three species of Chilian *Rodentia*, viz. *Octodon degus*, *Spalacopus Poëppigii*, and *Cavia australis*. Also skeletons of *Scolopax rusticola* and of *Podiceps cristatus*; and numerous bird-skins, comprising the following species new to the museum. *Psittacula passerina*, *Ieracidea berigora*, *Leuconerpes dominicanus*, *Eudynamys taitensis*, *Saurothera vetula*, *Diplopterus guira*, *Ægotheles novæ hollandiæ*, *Podager nacunda* (?), *Petroplanes Temminckii*, *Eulampis jugularis*, and some other *Trochilidæ*, *Strepera arguta*, *Donacobius atricapillus*, *Cichlaris guianensis*, *Grauculus canus*, *Platysteira melanoptera*, *Todirostrum melanocephalum*, *Petroica bicolor*, *Prothemadera novæ zeelandiæ*, *Odontophorus dentatus*, *Lobipes hyperboreus*, and *Dendrocygna arborea*, with some other species already in the museum.

2. Collected by Lt. Abbott, of the 18th Royal Irish Regiment. A large and very fine collection of shells from V. D. Land and Torres' Straits, also a skin of *Dasyurus maculatus*, and a very fine example of *Botaurus melanotus*, both from V. D. Land. Specimens of an *Auricula* from the Sunderbuus; and the young of *Arachnothera magna* from Darjiling.

3. Collected at Muscat, by Captain Hodges of the 'Almohammady.' A collection of fishes mostly in excellent condition; and another large jar containing examples of most of the species brought to the fish-bazar at Muscat, was unfortunately broken during rough weather, and the specimens destroyed. Among those brought is a fine *Acanthurus* (wholly black, with bright yellow caudal fin), which is not described in the *Hist. des Poissons*,—a large *Ostracion* of the *Lactophrys* division, and specimens of *Heniochus macrolepidotus*, *Thynnus pelamys*, *Amphicanthus sutor*, *Scarus psittacus*, Rüppell, *Belone annulata*, and others undetermined. Captain Hodges also collected a few sea-shells and sundries; and brought a spoiled specimen of a Frigate-bird from the Indian Ocean, which corresponds with *Attagen ariel*, Gould.

4. Another good collection of fishes in spirit was brought by Mr. Moxon of the Pilot Service from Malacca. Among them are some not included in Dr. Cantor's lately published Catalogue of Malayan fishes, and I recognise an undoubted specimen of *Caranx xanthurus*, Kuhl and V. Hasselt, and a *Cæsius* allied to *C. erythrogaster*, ibid.; also *Psettus rhombeus* and other genera new to the Society's collection. Mr. Moxon also brought some

*Holothurie*, Crabs (a *Lupa* and a *Grapsus*), a *Draco volans*, and a *Coluber*; also a particularly fine specimen of *Helix uncinata*, Fer., and faded examples of *Cyclostoma semisulcatum*, Sow., and other land-shells, all from Malacca; and finally he has permitted me to select several interesting skins of mammalia, and of birds an adult *Pontoœetus humilis*, and chick and male of the first year of the Argus Pheasant. Among the mammalia is a skin of *Sciurus laticaudatus*, Muller, one of three in the collection; and one of a Squirrel affined to, but not wholly resembling, *Sc. modestus*, Muller, and which is not included in Dr. Cantor's catalogue of mammalia inhabiting the Malayan peninsula.

5. From Sr. Lustra, of the Spanish Frigate 'La Ferrolana.' A few marine Philippine shells, comprising beautiful examples of *Cypræa geographica*.

6. From Babu Rajendra Mullika. Several carcasses of animals, including a fine Gazelle (*E. cora*, var. ?), a young buck *Bara Singha* Deer, and other specimens.

7. From Mr. Robinson, Inspector of Govt. Schools, Asám. A few shells sent for determination, among which are fragments of the curious Helicine genus *Megaspira*, a *Unio* which seems peculiar, and examples of *Melania terebra*.

8. From Capt. Banks, of the ship 'Owen Potter.' The skin of a remarkably fine adult specimen of *Diomedea exulans*.

9. From Mr. Piddington. A snake (*Bungarus cœruleus*) which was killed in the hold of the ship Hyderee, a Bombay vessel, which has been in this port, however, upwards of a year.

10. From Mr. Kelaart, of the Ceylon Medical Service. Two collections of Cinghalese mammalia and birds from the mountainous or Kandyan country, upon which I am preparing a separate and more elaborate report. Several new species are sent, and the mass of these collections is to be returned; but Mr. Kelaart has presented some specimens to the Society, among which are *Sciurus trilineatus*, Waterhouse (new to Ceylon), *Palæornis Calthrapæ*, *Spizaetus nipalensis* (from Newera Ellia, and not hitherto observed in S. India), and both sexes of a *Caprimulgus* affined to *C. indicus* but smaller, of which Mr. Jerdon formerly sent a specimen from the Nilgiris (vide J. A. S. XIV, 208, note).

11. From Mr. J. Baker, Noacolly. A specimen (injured) of *Ketupa ceylonensis*.

12. I further present to the museum two examples of a new species of *Garrulax*, sent to me alive from Charra Punji by Mr. Frith; and specimens of *Platycercus Baueri* and *Cairina moschata*.

I also beg to call attention to some of the skeletons which have been

recently mounted, as the large female cetel noticed in p. 426; that of a female Gaour; and the Giraffe skeleton will also be soon added.

I am, Sir,

Your Obedient Servant,

*As. Soc. Rooms, Jan. 3rd, 1851.*

E. BLYTH.

*To the Secretary of the Asiatic Society.*

#### LIBRARY.

The following books have been added to the Library since the last meeting.

#### PRESENTED.

The Rig-veda Sañhitá with the Commentary of Mádhaváchárya. Edited by Dr. Max. Muller. London 1850. 4to.—PRESENTED BY THE HON'BLE COURT OF DIRECTORS OF THE EAST INDIA COMPANY.

Observations made at the Magnetical and Meteorological Observatory at Hobart Town in Van Diemen Island, and by the Antarctic Naval Expedition. Printed by order of Her Majesty's Government under the Superintendence of Lieut.-Col. E. Sabine. Vol. I. Commencing with 1841. With abstracts of the observations from 1841 to 1848, inclusive. London 1850. 4to.—BY THE SAME.

The Natural Productions of Burmah, or Notes on the Fauna, Flora, and Minerals of the Tenasserim Provinces and the Burman Empire. By Rev. Francis Mason, A. M. Moulmein 1850, 12mo.—BY THE AUTHOR.

Journal of the Academy of Natural Sciences of Philadelphia, Vol. I. @ VIII. (Vol. VI. part 1, wanting). 8vo.—BY THE ACADEMY.

Ditto ditto New Series, 4to. Vol. I. 4 parts.—BY THE SAME.

Proceedings of the Academy of Natural Sciences of Philadelphia. Vols. I. @ III. and the first 5 Nos. of Vol. IV.—BY THE SAME.

Notice of the Academy of Natural Sciences of Philadelphia with an Appendix. Phil. 1836, Pamphlet. 8vo.—BY THE SAME.

A Memoir of William Maclure, Esq. By Dr. S. G. Morton, Phil. 1841. 8vo. Pamphlet.—BY THE SAME.

Additional Observations on a new Living Species of Hippopotamus, of Western Africa, (*Hippopotamus siberiensis*). By Samuel George Morton, M. D. Philadelphia 1849, fol. (Pamphlet).—BY THE AUTHOR.

Monograph of the Fossil Squalidæ of the United States. By Robert W. Gibbes, M. D. Philadelphia 1848, fol. (Pamphlet).—BY THE AUTHOR.

Catalogue of Skulls of Man and the Inferior Animals in the collection of Dr. S. G. Morton. Third Edition. Phil. 1849. 8vo. Pamphlet.—BY DR. S. G. MORTON.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of November, 1850.—BY THE DEPUTY SURVEYOR GENERAL.

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*Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of January, 1851.*

| Date. | Observations made at Sun-rise. |              |         |          |       |                | Observations made at apparent noon. |              |         |          |          |                | Minimum Pressure observed at 9h. 50m. |              |         |          |          |                |
|-------|--------------------------------|--------------|---------|----------|-------|----------------|-------------------------------------|--------------|---------|----------|----------|----------------|---------------------------------------|--------------|---------|----------|----------|----------------|
|       | Bar. red. to 32° F.            | Temperature. |         |          | Wind. | Aspect of Sky. | Bar. red. to 32° F.                 | Temperature. |         |          | Wind.    | Aspect of Sky. | Bar. red. to 32° F.                   | Temperature. |         |          | Wind.    | Aspect of Sky. |
|       |                                | Of Mer.      | Of Air. | W. Bulb. |       |                |                                     | Of Mer.      | Of Air. | W. Bulb. |          |                |                                       | Of Mer.      | Of Air. | W. Bulb. |          |                |
|       | Inches                         | °            | °       | °        |       |                | Inches                              | °            | °       | °        |          |                | Inches                                | °            | °       | °        |          |                |
| 1     | 30.015                         | 59.4         | 60.0    | 58.4     | Calm  | Clear          | 30.054                              | 67.8         | 71.3    | 66.4     | N.       | Cirro-strati   | 29.994                                | 73.5         | 75.5    | 67.3     | N.       | Cumuli         |
| 2     | 29.980                         | 63.4         | 63.0    | 62.3     | Ditto | Ditto          | .023                                | 69.8         | 72.0    | 68.0     | S. W.    | Clear          | .979                                  | 75.2         | 76.5    | 70.0     | S.       | Ditto          |
| 3     | 30.038                         | 64.4         | 63.8    | 62.5     | N.    | Cloudy         | .102                                | 66.2         | 66.2    | 63.4     | N. N. W. | Cumuli         | 30.066                                | 70.3         | 71.2    | 64.8     | W.       | Ditto          |
| 4     | .082                           | 59.2         | 58.2    | 58.0     | Calm  | Foggy          | .151                                | 62.5         | 64.7    | 61.0     | N.       | Clear          | .101                                  | 69.0         | 70.3    | 62.2     | N.       | Ditto          |
| 5S    | .071                           | 59.4         | 59.3    | 58.0     | N.    | Clear          | .118                                | 64.7         | 66.0    | 61.6     | N.       | Ditto          | .051                                  | 69.0         | 69.7    | 62.4     | N.       | Ditto          |
| 6     | .001                           | 59.9         | 59.0    | 58.0     | N.    | Ditto          | .074                                | 64.3         | 66.2    | 61.3     | N.       | Ditto          | .014                                  | 69.6         | 70.6    | 62.6     | N. W.    | Ditto          |
| 7     | .052                           | 59.2         | 59.2    | 57.4     | N.    | Ditto          | .108                                | 65.3         | 67.0    | 62.0     | N.       | Ditto          | .064                                  | 71.2         | 72.8    | 63.6     | N. W.    | Cumulo-strati  |
| 8     | .062                           | 58.4         | 58.4    | 57.0     | Calm  | Ditto          | .133                                | 66.3         | 69.4    | 63.8     | N. W.    | Ditto          | .077                                  | 72.0         | 73.3    | 63.6     | N. W.    | Cumuli         |
| 9     | .064                           | 59.0         | 59.0    | 58.0     | Ditto | Ditto          | .128                                | 66.6         | 69.4    | 63.8     | N. E.    | Ditto          | .075                                  | 73.6         | 76.5    | 66.3     | N.       | Clear          |
| 10    | .031                           | 61.7         | 61.5    | 60.6     | N. E. | Ditto          | .123                                | 68.6         | 71.0    | 64.4     | N. E.    | Ditto          | .068                                  | 74.3         | 76.6    | 67.2     | N. E.    | Ditto          |
| 11    | .053                           | 61.2         | 61.4    | 60.0     | N.    | Ditto          | .123                                | 68.6         | 70.8    | 64.6     | N.       | Ditto          | .068                                  | 73.2         | 75.0    | 65.2     | N.       | Ditto          |
| 12S   | .046                           | 61.8         | 62.2    | 61.0     | N.    | Ditto          | .101                                | 68.6         | 70.6    | 65.3     | N.       | Ditto          | .044                                  | 73.3         | 75.2    | 65.6     | N.       | Ditto          |
| 13    | .001                           | 63.0         | 62.5    | 61.6     | N.    | Cirro-strati   | .061                                | 69.2         | 71.3    | 66.3     | N. E.    | Cumuli         | .013                                  | 75.2         | 77.2    | 67.7     | E.       | Cirro-strati   |
| 14    | .058                           | 66.4         | 66.4    | 65.3     | N.    | Cloudy         | .118                                | 69.8         | 71.2    | 68.7     | N. E.    | Ditto          | .070                                  | 74.7         | 75.4    | 70.9     | N. W.    | Cumulo-strati  |
| 15    | .045                           | 64.6         | 64.0    | 62.8     | N.    | Cumuli         | .134                                | 68.0         | 68.9    | 65.6     | N.       | Clear          | .094                                  | 72.4         | 74.2    | 67.8     | N. W.    | Cumuli         |
| 16    | .076                           | 61.2         | 60.6    | 58.3     | N.    | Clear          | .176                                | 66.3         | 68.0    | 60.7     | N. sharp | Ditto          | .141                                  | 70.4         | 70.9    | 60.3     | N. sharp | Clear          |
| 17    | .100                           | 59.2         | 58.8    | 56.3     | N.    | Ditto          | .167                                | 65.4         | 67.0    | 58.6     | N.       | Ditto          | .116                                  | 70.8         | 73.0    | 61.4     | N. N. W. | Ditto          |
| 18    | .078                           | 58.4         | 57.8    | 54.5     | N.    | Cirro-strati   | .160                                | 64.7         | 66.4    | 58.3     | N.       | Cirro-strati   | .107                                  | 69.7         | 70.8    | 59.8     | N.       | Cirro-strati   |
| 19S   | .047                           | 58.2         | 57.9    | 55.3     | Calm  | Clear          | .118                                | 67.2         | 70.2    | 61.0     | N.       | Clear          | .073                                  | 72.6         | 74.3    | 62.6     | N.       | Clear          |
| 20    | .031                           | 60.0         | 60.2    | 58.3     | N.    | Ditto          | .088                                | 67.8         | 70.4    | 63.3     | N.       | Ditto          | .042                                  | 74.0         | 76.6    | 65.3     | N.       | Ditto          |
| 21    | .070                           | 61.5         | 61.6    | 59.8     | N.    | Cirro-strati   | .131                                | 69.7         | 72.3    | 65.8     | N.       | Cirro-strati   | .091                                  | 75.0         | 77.0    | 67.4     | N.       | Cirro-strati   |
| 22    | .122                           | 65.2         | 64.4    | 61.1     | N.    | Ditto          | .182                                | 68.5         | 69.3    | 60.9     | N. W.    | Clear          | .136                                  | 72.5         | 74.0    | 63.4     | N. W.    | Clear          |
| 23    | .146                           | 59.6         | 59.0    | 55.3     | N.    | Ditto          | .210                                | 64.2         | 64.8    | 56.0     | N.       | Ditto          | .145                                  | 69.0         | 69.6    | 58.0     | N. W.    | Ditto          |
| 24    | .119                           | 56.9         | 56.0    | 53.7     | N.    | Clear          | .168                                | 62.6         | 63.9    | 58.0     | N. W.    | Ditto          | .106                                  | 67.8         | 69.0    | 60.2     | N. W.    | Ditto          |
| 25    | .045                           | 56.4         | 56.5    | 55.4     | N.    | Foggy          | .124                                | 64.0         | 65.4    | 60.6     | N.       | Ditto          | .071                                  | 69.5         | 70.6    | 60.8     | N.       | Ditto          |
| 26S   | .065                           | 57.8         | 57.9    | 56.4     | N.    | Cirro-strati   | .123                                | 65.5         | 68.2    | 61.4     | N. W.    | Cirro-strati   | .077                                  | 70.6         | 72.2    | 62.6     | N. W.    | Cirro-strati   |
| 27    | .046                           | 60.5         | 61.2    | 60.0     | Calm  | Foggy          | .112                                | 65.9         | 68.9    | 66.2     | N.       | Clear          | .050                                  | 73.0         | 74.5    | 67.3     | S. W.    | Cumuli         |
| 28    | .041                           | 61.2         | 61.0    | 60.0     | Ditto | Ditto          | .090                                | 67.0         | 70.5    | 66.6     | S.       | Cumuli         | .032                                  | 73.8         | 76.0    | 68.2     | S. W.    | Cirro-strati   |
| 29    | .011                           | 63.0         | 62.8    | 62.2     | N.    | Cirro-strati   | .061                                | 69.0         | 71.0    | 64.5     | N.       | Cirro-strati   | .019                                  | 73.0         | 75.0    | 66.5     | N.       | Ditto          |
| 30    | 29.991                         | 64.0         | 63.7    | 63.4     | N.    | Foggy          | .051                                | 66.3         | 68.0    | 66.2     | S. W.    | Clear          | .009                                  | 73.3         | 76.2    | 67.4     | S. W.    | Clear          |
| 31    | 30.001                         | 62.5         | 62.5    | 61.3     | N.    | Cirro-strati   | .094                                | 69.0         | 71.3    | 67.0     | N.       | Cirro-strati   | .046                                  | 73.5         | 75.5    | 67.2     | N. W.    | Cirro-strati   |
| Mean  | 30.051                         | 60.9         | 60.6    | 59.1     | ....  | .....          | 30.116                              | 66.8         | 68.8    | 63.3     | ....     | .....          | 30.067                                | 72.1         | 73.7    | 64.7     | ...      | .....          |

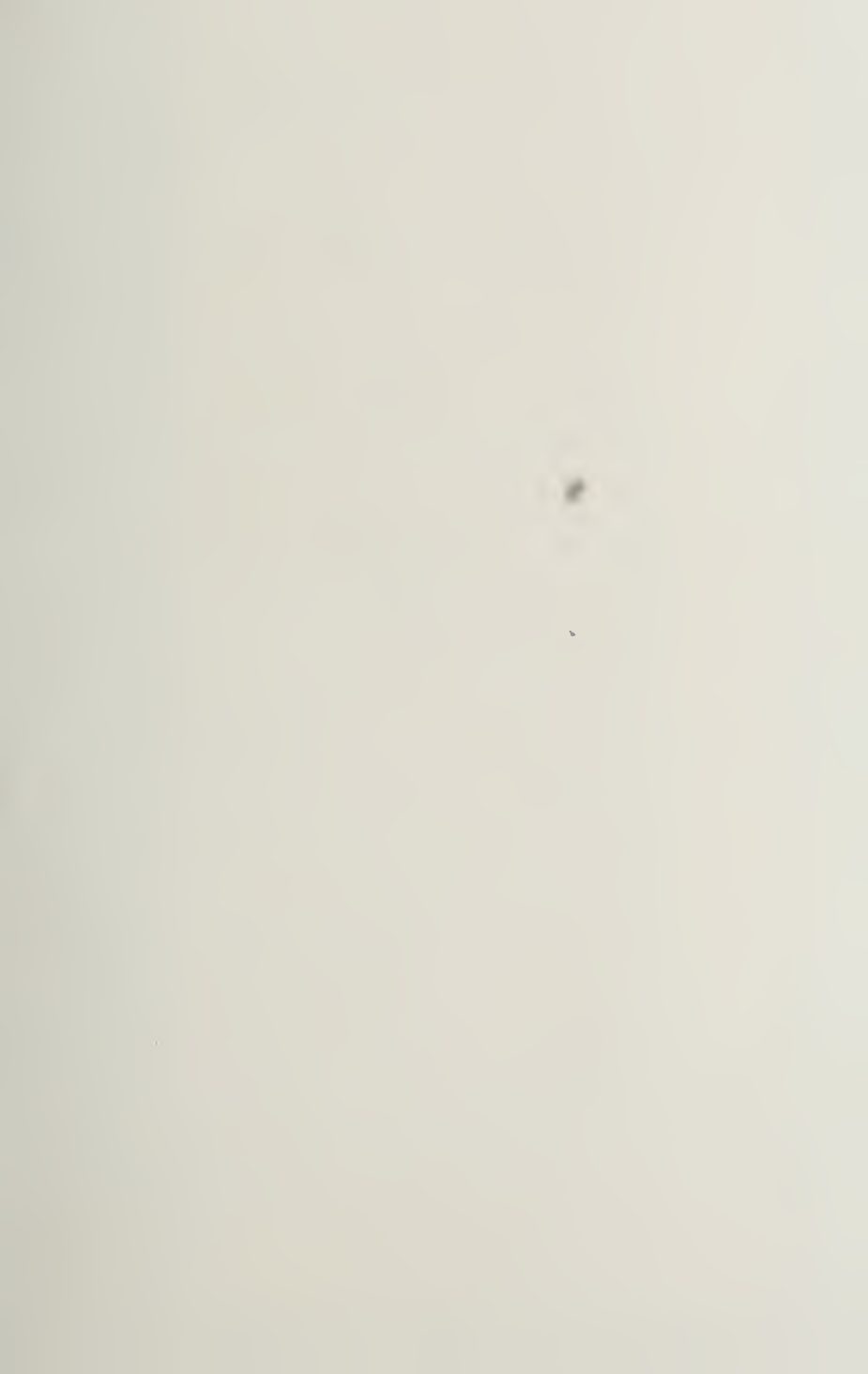


# [Meteorological Register, continued.]

| Observations made at 2 1/2, 4 1/2 m. |              |         |                |          |               | Minimum Pressure observed at 4 p. m. |              |         |                |          |               | Observations made at sun-set. |              |         |                |       |              | Maximum and Minimum Thermometer. |       |      | Max. Therms. in sun's rays. | Rain Gauges |          | Moon's Phase | Date. |
|--------------------------------------|--------------|---------|----------------|----------|---------------|--------------------------------------|--------------|---------|----------------|----------|---------------|-------------------------------|--------------|---------|----------------|-------|--------------|----------------------------------|-------|------|-----------------------------|-------------|----------|--------------|-------|
| Bar. red. to 32° F.                  | Temperature. | Wind.   | Aspect of Sky. |          |               | Bar. red. to 32° F.                  | Temperature. | Wind.   | Aspect of Sky. |          |               | Bar. red. to 32° F.           | Temperature. | Wind.   | Aspect of Sky. |       |              | Max.                             | Mean. | Min. |                             | Upper 4.    | Lower 4. |              |       |
| Inches                               | Of Mer.      | Of Air. |                |          |               | Inches                               | Of Mer.      | Of Air. |                |          |               | Inches                        | Of Mer.      | Of Air. |                |       |              | °                                | °     | °    | °                           | Inch.       | Inch.    |              |       |
| 29.938                               | 77.0         | 77.8    | 68.3           | N.       | Cumuli        | 29.920                               | 76.5         | 76.3    | 68.0           | N.       | Cumuli        | 29.924                        | 74.7         | 74.0    | 67.9           | N.    | Clear        | 78.3                             | 69.2  | 60.0 | 97.7                        | ..          | 00.7     | 1            |       |
| .913                                 | 78.3         | 79.0    | 70.3           | S.       | Cumulo-strati | .902                                 | 77.7         | 77.3    | 68.2           | S.       | Cumulo-strati | .900                          | 75.0         | 74.0    | 68.4           | S.    | Cirro-strati | 79.3                             | 71.5  | 63.6 | 93.8                        | ..          | ..       | 2            |       |
| 30.000                               | 73.4         | 74.0    | 64.3           | N.       | Cumuli        | .999                                 | 73.0         | 72.5    | 63.0           | N.       | Clear         | .992                          | 71.0         | 70.3    | 63.8           | N.    | Clear        | 74.6                             | 69.6  | 64.5 | 90.8                        | ..          | ..       | 3            |       |
| .035                                 | 72.7         | 73.5    | 64.3           | N.       | Ditto         | 30.022                               | 72.4         | 72.0    | 63.3           | N.       | Cumuli        | 30.034                        | 70.8         | 69.8    | 63.3           | N.    | Cirro-strati | 73.7                             | 65.9  | 58.0 | 89.7                        | ..          | ..       | 4            |       |
| 29.971                               | 73.0         | 72.8    | 62.4           | N.       | Ditto         | 29.967                               | 72.0         | 71.4    | 62.0           | N. W.    | Ditto         | 29.973                        | 70.2         | 69.0    | 62.4           | N. W. | Clear        | 73.7                             | 66.7  | 59.7 | 87.0                        | ..          | ..       | 5            |       |
| .957                                 | 73.0         | 73.3    | 62.7           | N.       | Ditto         | .963                                 | 72.3         | 72.0    | 62.0           | N. W.    | Cirro-strati  | .974                          | 70.8         | 69.8    | 62.0           | N. W. | Cirro-strati | 73.7                             | 66.4  | 59.0 | 88.0                        | ..          | ..       | 6            |       |
| .995                                 | 75.0         | 75.3    | 64.6           | N.       | Clear         | .990                                 | 74.0         | 73.3    | 63.8           | W.       | Clear         | .987                          | 72.3         | 71.3    | 63.3           | N.    | Clear        | 75.7                             | 67.4  | 59.0 | 93.0                        | ..          | ..       | 7            |       |
| 30.013                               | 75.8         | 76.4    | 64.7           | N.       | Ditto         | .995                                 | 75.2         | 74.8    | 63.8           | N. W.    | Ditto         | .989                          | 73.0         | 71.4    | 64.0           | N.    | Ditto        | 76.9                             | 67.7  | 58.5 | 93.5                        | ..          | ..       | 8            |       |
| 29.991                               | 78.0         | 79.2    | 67.3           | S.       | Ditto         | .983                                 | 77.8         | 77.6    | 66.2           | S.       | Ditto         | .977                          | 75.8         | 74.4    | 66.2           | S. W. | Ditto        | 79.5                             | 69.3  | 59.0 | 98.0                        | ..          | ..       | 9            |       |
| .995                                 | 78.0         | 78.7    | 67.4           | N. E.    | Ditto         | .981                                 | 77.6         | 77.0    | 66.6           | N.       | Ditto         | .993                          | 75.0         | 74.0    | 61.2           | N.    | Ditto        | 79.4                             | 70.5  | 61.5 | 96.6                        | ..          | ..       | 10           |       |
| .999                                 | 77.5         | 78.2    | 67.2           | N. W.    | Ditto         | .993                                 | 77.4         | 77.0    | 67.0           | N.       | Ditto         | 30.007                        | 75.0         | 74.0    | 66.7           | N.    | Ditto        | 79.0                             | 70.3  | 61.5 | 94.4                        | ..          | ..       | 11           |       |
| .962                                 | 78.4         | 80.2    | 66.8           | N.       | Ditto         | .952                                 | 78.4         | 78.2    | 67.0           | N.       | Ditto         | 29.967                        | 76.0         | 75.0    | 67.6           | N.    | Ditto        | 79.8                             | 71.0  | 62.2 | 100.6                       | ..          | ..       | 12           |       |
| .952                                 | 79.3         | 80.3    | 69.0           | N. E.    | Cirro-strati  | .949                                 | 78.7         | 78.4    | 69.6           | S. E.    | Cirro-strati  | .964                          | 76.3         | 75.6    | 69.0           | S. E. | Cloudy       | 80.8                             | 71.8  | 62.7 | 99.0                        | ..          | ..       | 13           |       |
| .982                                 | 76.4         | 77.7    | 71.6           | N. W.    | Cumuli        | .978                                 | 76.4         | 75.9    | 70.8           | N. W.    | Cumuli        | .982                          | 74.2         | 73.0    | 69.7           | N. W. | Ditto        | 78.5                             | 72.3  | 66.0 | 94.2                        | ..          | ..       | 14           |       |
| 30.020                               | 76.4         | 76.4    | 68.0           | NNW      | Ditto         | 30.013                               | 75.2         | 74.3    | 66.9           | NNW      | Ditto         | 30.032                        | 74.3         | 72.7    | 66.3           | N.    | Clear        | 77.3                             | 70.8  | 64.3 | 93.2                        | ..          | ..       | 15           |       |
| .054                                 | 73.4         | 73.5    | 62.2           | NNW      | Clear         | .027                                 | 72.9         | 71.9    | 61.0           | N.       | Clear         | .031                          | 70.7         | 69.3    | 60.4           | N.    | Ditto        | 74.3                             | 67.6  | 60.8 | 90.8                        | ..          | ..       | 16           |       |
| .047                                 | 74.3         | 74.8    | 62.5           | W.       | Ditto         | .032                                 | 73.8         | 73.0    | 61.4           | N. W.    | Ditto         | .042                          | 70.5         | 70.3    | 61.8           | N.    | Ditto        | 75.5                             | 67.3  | 59.0 | 91.6                        | ..          | ..       | 17           |       |
| .033                                 | 74.3         | 75.0    | 61.2           | W.       | Cirro-strati  | .017                                 | 74.4         | 73.9    | 60.8           | NNW      | Ditto         | .025                          | 72.2         | 70.8    | 60.9           | N.    | Ditto        | 75.7                             | 66.9  | 58.0 | 90.4                        | ..          | ..       | 18           |       |
| .001                                 | 76.2         | 76.9    | 63.6           | N.       | Clear         | 29.987                               | 76.0         | 75.3    | 63.0           | N.       | Ditto         | 29.995                        | 73.3         | 72.3    | 64.3           | N.    | Ditto        | 77.6                             | 67.9  | 58.2 | 93.0                        | ..          | ..       | 19           |       |
| 29.978                               | 78.6         | 79.6    | 67.3           | N.       | Ditto         | .962                                 | 78.5         | 78.1    | 66.2           | N.       | Ditto         | .970                          | 75.6         | 74.3    | 66.8           | N.    | Cirro-strati | 80.4                             | 70.4  | 60.4 | 100.5                       | ..          | ..       | 20           |       |
| 30.022                               | 79.3         | 79.9    | 67.7           | N.       | Cirro-strati  | 30.014                               | 79.3         | 79.0    | 67.5           | N.       | Cirro-strati  | 30.024                        | 76.5         | 75.3    | 67.4           | N.    | Clear        | 80.8                             | 71.1  | 61.9 | 94.0                        | ..          | ..       | 21           |       |
| .063                                 | 76.3         | 77.2    | 66.5           | N. W.    | Clear         | .052                                 | 76.6         | 76.0    | 65.9           | N.       | Clear         | .058                          | 74.0         | 72.9    | 65.0           | N.    | Ditto        | 78.2                             | 71.5  | 64.8 | 94.0                        | ..          | ..       | 22           |       |
| .065                                 | 72.2         | 72.5    | 60.0           | W.       | Ditto         | .045                                 | 72.2         | 71.1    | 59.3           | W. N. W. | Ditto         | .059                          | 69.7         | 68.0    | 59.3           | N. W. | Ditto        | 73.0                             | 66.0  | 59.0 | 88.3                        | ..          | ..       | 23           |       |
| .021                                 | 71.5         | 71.3    | 60.2           | W. N. W. | Ditto         | .012                                 | 71.7         | 71.4    | 60.2           | W. N. W. | Ditto         | .022                          | 69.5         | 68.5    | 60.8           | N. W. | Ditto        | 72.9                             | 64.7  | 56.5 | 86.2                        | ..          | ..       | 24           |       |
| 29.993                               | 73.0         | 73.3    | 61.4           | N. W.    | Cirro-strati  | 29.991                               | 73.0         | 72.7    | 61.2           | N. W.    | Cirro-strati  | .007                          | 71.3         | 69.5    | 62.0           | N.    | Cirro-strati | 74.4                             | 65.6  | 56.7 | 86.7                        | ..          | ..       | 25           |       |
| .983                                 | 75.0         | 75.2    | 61.8           | N. W.    | Ditto         | .977                                 | 74.9         | 74.3    | 61.3           | N. W.    | Ditto         | 29.983                        | 72.2         | 70.7    | 62.6           | N.    | Ditto        | 76.2                             | 67.0  | 57.8 | 92.8                        | ..          | ..       | 26           |       |
| .979                                 | 77.4         | 78.3    | 66.3           | S. W.    | Clear         | .983                                 | 77.3         | 76.7    | 65.0           | S. W.    | Clear         | .973                          | 74.8         | 73.7    | 65.8           | N.    | Clear        | 78.6                             | 69.5  | 60.4 | 95.4                        | ..          | ..       | 27           |       |
| .955                                 | 78.3         | 79.2    | 66.8           | S.       | Cirro-strati  | .947                                 | 78.0         | 78.0    | 63.6           | S. W.    | Cirro-strati  | .955                          | 75.2         | 74.0    | 65.2           | S. W. | Cirro-strati | 79.6                             | 70.3  | 61.0 | 96.0                        | ..          | ..       | 28           |       |
| .937                                 | 78.3         | 78.2    | 66.8           | N.       | Ditto         | .933                                 | 78.0         | 77.8    | 66.3           | N.       | Ditto         | .932                          | 75.4         | 75.0    | 67.4           | N.    | Ditto        | 79.3                             | 71.4  | 63.5 | 95.7                        | ..          | ..       | 29           |       |
| .915                                 | 78.2         | 79.0    | 68.0           | W.       | Ditto         | .941                                 | 79.0         | 78.7    | 66.5           | N. W.    | Ditto         | .951                          | 75.8         | 74.6    | 67.6           | N. W. | Ditto        | 79.8                             | 72.1  | 64.3 | 97.7                        | ..          | ..       | 30           |       |
| .974                                 | 78.3         | 80.0    | 68.5           | N.       | Ditto         | .976                                 | 79.4         | 79.6    | 67.7           | N.       | Ditto         | .980                          | 76.8         | 76.0    | 67.5           | N.    | Ditto        | 80.6                             | 72.0  | 63.3 | 98.8                        | ..          | ..       | 31           |       |
| 29.993                               | 76.0         | 76.7    | 65.5           | ....     | .....         | 29.983                               | 75.8         | 75.3    | 64.7           | ....     | .....         | 29.990                        | 73.5         | 72.4    | 64.7           | ....  | .....        | 77.3                             | 69.1  | 60.8 | 93.6                        | ..          | 00.7     |              |       |









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